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LEE & RO, Inc.

March 9, 2010

Ms. Lixin Fu
California Regional Water Quality Control Board
Central Valley
11020 Sun Center Drive No. 200
Rancho Cordova, California 95670

Subject: City of Ione Water Reclamation Facility
Report of Waste Discharge

730-01H

Ms. Fu:

Enclosed is one original signed copy of the Ione Water Reclamation Facility - Report of Waste Discharge (RWD) prepared by LEE & RO Inc. for review and approval by the Central Valley Regional Water Quality Control Board. The City has been active in the past few months finalizing the associated project planning documents. Both the City Wastewater Master Plan and companion EIR were respectively adopted and certified by the City Council on December 15, 2009.

The City continues to pursue regional treatment and reclamation strategies, but does not desire a further delay in construction of new treatment and disposal facilities as required for planned City growth and for compliance with Cease and Desist Order R5-2003-0108.

A complete project schedule is contained in the RWD with a project construction completion date in December 2011. Selection of a Design-Build Firm is scheduled to be made by the City Council in October 2010.

Should you have any questions regarding this letter or the enclosed report, please do not hesitate to call me at 916/631.0111 ext 614 or email me at bob.godwin@lee-ro.com.

Sincerely,

LEE & RO, Inc.

Bob G.

Robert O. Godwin P.E.
Project Manager

cc: File 730-01H
Mary Boyd, Compliance and Enforcement Section (one original)
Kim Kerr, City of Ione (two copies)
Kristen Castaños, Stoel Rives (one copy)

IONE WATER RECLAMATION FACILITY

Amador County
1600 West Marlette Street
Ione, California 95640

REPORT OF WASTE DISCHARGE

Report Prepared By:

LEE & RO, Inc.
8880 Cal Center Drive, Suite 170
Sacramento, CA 95826

March 9, 2010

REMARKS AND SIGNATURE

The interpretations and conclusions contained in this report represent professional opinions based on currently available information, and were developed in accordance with accepted engineering practices for this specific project and site. Other than this, no warranty is implied nor intended.

This report has been prepared solely for the use of the City of Ione. The work described herein was performed by or under the direct supervision of the Civil Engineer, registered in the State of California, whose seal and signature appears below.

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SECTION 1 - INTRODUCTION

The City of Ione owns and operates two wastewater treatment and disposal facilities: the City of Ione Wastewater Treatment Plant (Ione WWTP) and the Castle Oaks Water Reclamation Plant (COWRP). The Ione WWTP is located south of Sutter Creek at 1600 Marlette Street. This facility provides municipal wastewater treatment and effluent disposal for the residents of Ione. However, this treatment facility has been deemed inadequate and will be replaced with the Ione Water Reclamation Facility (IWRF). The second wastewater facility owned and operated by the City is the COWRP. The COWRP currently treats secondary effluent from either Mule Creek State Prison and/or Amador Regional Sanitation Authority (ARSA). No modifications to the COWRP or changes in operation at the Castle Oaks Golf Course are proposed in this report. A topographic map displaying the location of the existing facilities is provided in **Appendix A**.

The City of Ione has prepared this Report of Waste Discharge (RWD) for the California Central Valley Regional Water Quality Control Board (Regional Board) for the operation of the IWRF and discharge of effluent from this facility to percolation ponds located on the site of the treatment facility. In the future, the City will prepare and submit a second RWD and Water Recycling Master Plan for a Master Water Reclamation Permit (MWRP).

Effluent from the IWRF shall meet or exceed Title 22 requirements for "disinfected tertiary recycled water" using chemically enhanced tertiary treatment and ultraviolet light disinfection pursuant to California Department of Health Services (DHS) requirements. Wastewater treatment, disposal and reclamation needs of the City through the year 2016 are examined in this report. Future facilities will the required to meet the needs of the City through the year 2030 and are briefly described in the report. The resulting new Waste Discharge Requirements (WDR) from the Regional Board will replace existing WDR 95-125. No changes are proposed to the Water Reclamation Requirements (WRR) 93-240. The Application/Report of Waste Discharge Form 200 is contained in **Appendix B**.

1.1 BACKGROUND

On July 11, 2003, the Regional Board issued Cease and Desist Order R5-2003-0108 (CDO) to the City. The CDO required preparation and submittal of several items, including a Wastewater Master Plan and a RWD. In response to the CDO, the City submitted a Wastewater Treatment Plant Master Plan in November 2004 followed by a RWD on June 9, 2006, as well as a companion Initial Study/Mitigated Negative Declaration. The Master Plan and RWD recommended expansion of the existing WWTP by constructing additional treatment and percolation ponds.

The Regional Board issued a letter dated February 20, 2007 stating that the RWD was incomplete for reasons such as: 1) the proposed treatment method (aerated treatment ponds) did not meet Best Practicable Treatment and Control (BPTC) standards, 2) the water balance calculations were not adequate for the proposed flow, and 3) completeness of the analysis of potential impacts on Sutter Creek and groundwater quality was insufficient.

Since receipt of this letter, the improvements, modifications, and/or upgrades discussed in the 2006 RWD have been discarded and the City has taken an entirely different approach to the expansion and replacement of the existing WWTP. The City proposes replacement of the entire secondary treatment pond system with a secondary/tertiary treatment system to produce Title 22 "disinfected tertiary recycled water" for both land disposal and reclamation.

The City intends to construct the new treatment and disposal facilities through a Design-Build process rather than a Design-Bid-Build process commonly seen in municipal construction projects. This process will reduce risk for the City associated with potential poor coordination between design and construction and accelerate the design and construction schedule. The City has retained LEE & RO Inc. to serve as both the City's wastewater consultant and as the Owner's Representative for the Design-Build process. The City is also seeking private financing for the facility construction and intends to establish a long term operations contract with the firm selected for design and construction.

Recently the City completed the Ione Wastewater Master Plan and Ione WWTP Master Plan Environmental Impact Report (EIR) dated December 2, 2009 and December 2009, respectively. The Ione City Council certified the EIR, adopted the corresponding Mitigation Monitoring and Reporting Program, and adopted the Master Plan on December 15, 2009. Throughout this report, references are made to both the Ione Wastewater Master Plan and Ione WWTP Master Plan EIR.

SECTION 2 - WASTEWATER FLOWS, STRENGTH AND QUALITY

In this section; the projected wastewater flows, strength and quality of the wastewater treated and disposed of at the IWRF are presented.

2.1 WASTEWATER FLOWS

The City of Ione operates a complex system with the existing WWTP treating municipal wastewater from the City of Ione and the COWRP treating secondary effluent from ARSA and/or Mule Creek State Prison for reclamation use on the Castle Oaks Golf Course. A flow diagram showing the wastewater sources, treatment and disposal for both the COWRP and Ione WWTP is shown as **Figure 2-1**. The proposed IWRF encompasses only the facilities under the current permit WDR 95-125 (Ione WWTP) and does not include facilities operated under WRR-93-240 (COWRP).

Figure 2-1: Flow Diagram of Existing Wastewater Treatment System.

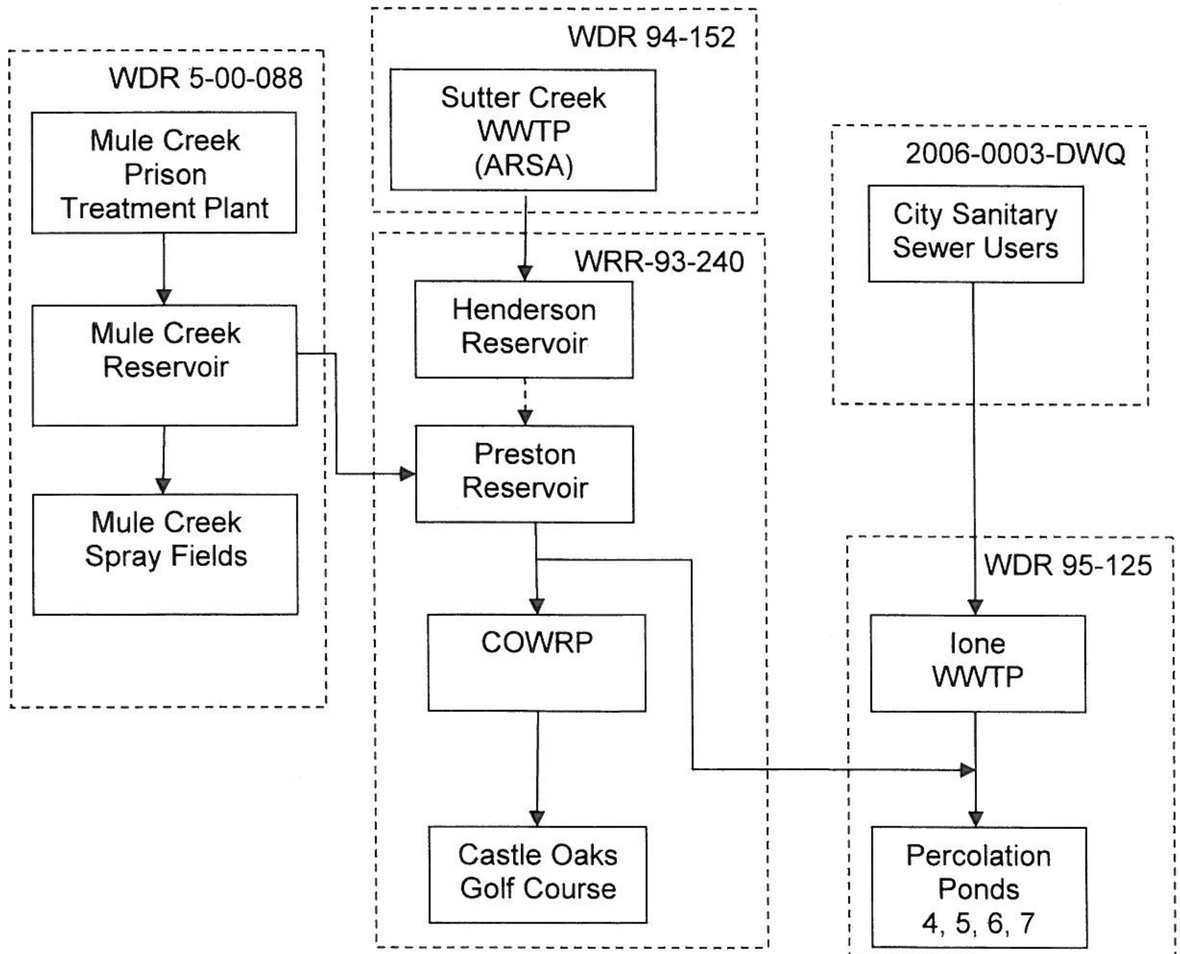
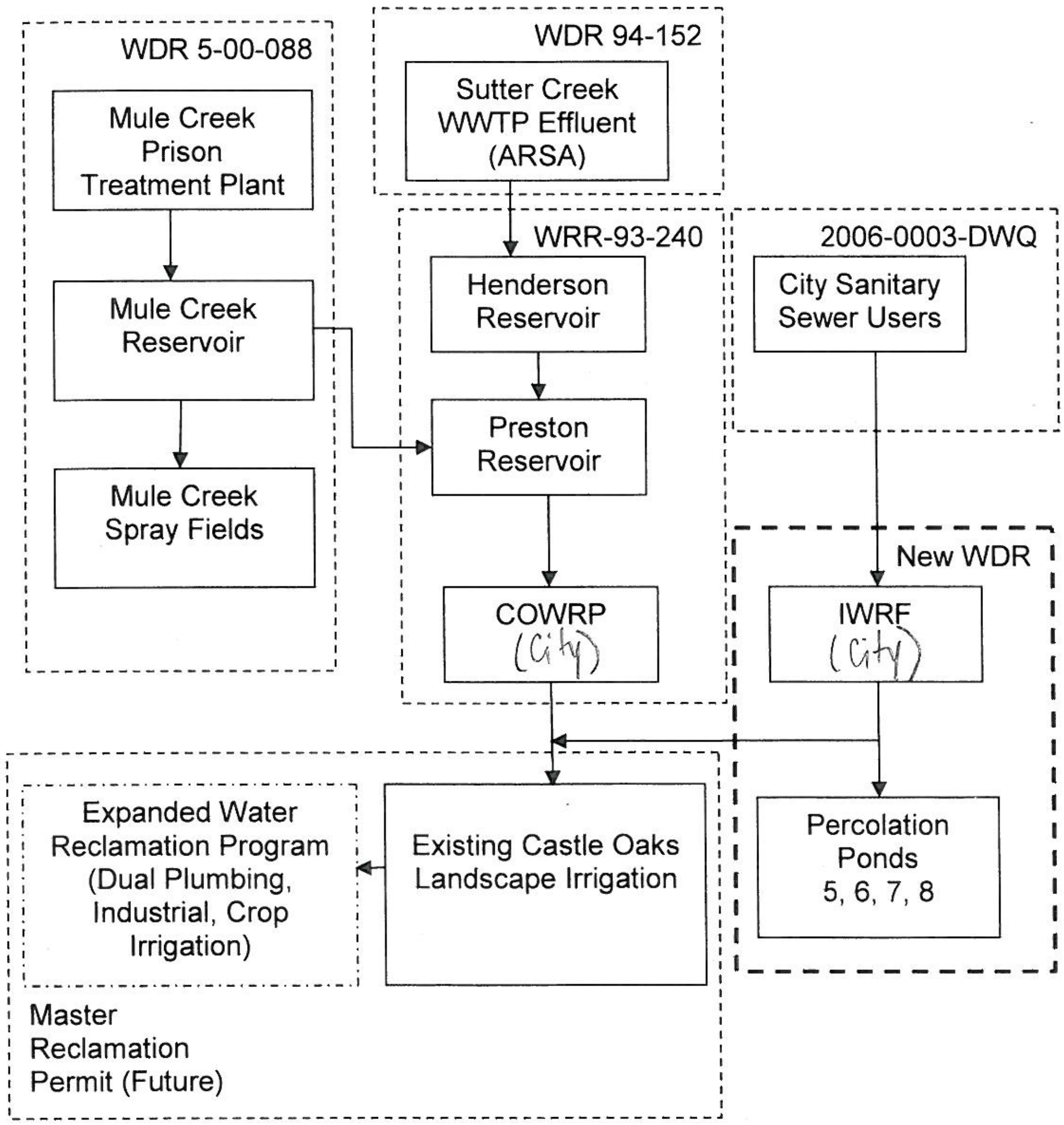


Figure 2-2 shows the proposed new and future wastewater treatment and disposal system in relationship to the other existing facilities and permits. The City of Ione is currently evaluating providing recycled water for a wide range of services in the future, such as use at the Castle Oaks Golf Course; providing water for fire fighting training purposes; for Unimin Mine operations (industrial); dual plumbing of toilets and sanitary facilities; irrigation of parks, landscaping and open spaces; and irrigation of agricultural land. These uses will require future construction of a reclaimed water distribution system and the future issuance of a MWRP by the Regional Board and approval by the DHS.

Figure 2-2: Flow Diagram of City of Ione Water Treatment and Disposal System



2.1.1 Ione Water Reclamation Facility - IWRF

Growth in the City of Ione is critical in understanding the volumes of wastewater anticipated at the IWRF. The Ione Wastewater Master Plan looked at population and development through 2030 using historical data, information provided by City staff, and information obtained from the 2009 General Plan, which was adopted by the City Council on August 26, 2009 along with the Council certifying the companion EIR.

As of July 1, 2003, the U.S. Census Bureau estimated the population of Ione to be 7,514, including the inmates at State facilities (Mule Creek State Prison and Preston Youth Correctional Facility). In the 2009 General Plan, the population was estimated to be 7,416 at the end of 2008 of which 3,890 were at State facilities. By 2030, the 2009 General Plan projects that the population will reach 17,258, excluding population at State facilities and will include 8,515,175 and 10,468,121 square feet of commercial and industrial development.

This rapid growth projection is based upon City zoning and does not necessarily reflect actual development that is likely to occur. Therefore, a reduced rate of development based upon an annual growth of 5% for residential, commercial and industrial properties was used for estimation. This 5% growth rate is a reasonable estimate since the General Plan Housing Needs Assessment Table HE-1 provided a historical population trend of 4% from 2000 to 2008. Presented in **Table 2-1** are the estimated flow projections by the year 2016 based on the 5% rate of development. These projections are conservative and the actual rate of development may be less.

Table 2-1: Projected Flow from Development by the Year 2016.

Development Type	Total Development	Estimated Flow	Total Flow
Single Family Units	2,202	200 gpd*	440,400 gpd
Multi-Family Units	287	150 gpd	43,050 gpd
Commercial	940,000 sq. ft.	0.1 gpd/ sq. ft.	94,000 gpd
Industrial	772,000 sq. ft.	0.1 gpd/ sq. ft.	77,200 gpd
Total			**654,650 gpd**

* gpd = gallons per day

In addition to development growth, the City receives wastewater flow from the Ione Water Treatment Plant (IWTP) operated by Amador Water Agency (AWA). Backwash water from the filters is discharged to the City sanitary sewer system on a daily basis, which averaged approximately 87,000 gpd in 2004. However, the volume of flow has decreased due to improvements in raw water quality, changes in operation at the IWTP, and reduction in consumption of potable water at the Mule Creek State Prison, the flow remains around 50,000 gpd. Although AWA has tentative plans to discontinue discharge of backwash water in the future due to the abandonment of the IWTP, the City has assumed that operations at the IWTP will continue indefinitely.

The Mule Creek State Prison currently treats wastewater from the California Department of Fire and Forestry Protection (CDF) Fire Academy; however, the Prison has no additional capacity thereby preventing CDF from building additional Fire Academy facilities. Therefore, the City has assumed that it will provide sanitary sewer service to the CDF for the new dormitories which will house fire fighters during training. It is assumed that approximately 14,000 gpd from the CDF Fire Academy will be sent to the IWRF starting in the year 2012, when the new treatment facilities are constructed.

The City of Ione's sewer collection system dates back to the 1950's and 1960's in the older sections of town. Due to its age, groundwater is infiltrating at deteriorating points in the collection system. The City is actively attempting to identify these areas of high I/I and repair these locations. To accomplish this, the City completed a video survey of the entire City collection system in 2008 and has plans to repair areas of significant infiltration based upon this survey. The infiltration rate increases during the wet seasons, and has historically reached as high as 80,000 gpd during the dry season. Exfiltration appears to occur during periods of extreme dry weather and low groundwater conditions.

A summary of the proposed wastewater flow components at the IWRF during average dry weather flow (ADWF) conditions is provided in **Table 2-2**. An ADWF treatment capacity of 0.8 MGD will be required to meet development in Ione by 2016. A capacity of 1.6 MGD will be required to meet buildout in 2030.

Table 2-2: Summary of Wastewater Flow Components at the IWRF.

Components	ADWF Wastewater Flows (gpd)
Residential, Commercial and Industrial Development	654,650
AWA Backwash Water	50,000
California Fire Academy	14,000
Groundwater Infiltration	80,000
Total	**798,650**

Table 2-3 provides a summary of the maximum daily flow, peak hourly flow and instantaneous peak flow. These flows were calculated by multiplying the ADWF by 1.9, 2.5 and 3.0 for maximum daily flow, peak hourly flow and instantaneous peak flow, respectively. Peaking values are based upon historical values recorded at the WWTP headworks.

Table 2-3: Summary of Wastewater Flows at IWRF.

ADWF (MGD)	Maximum Daily Flow (MGD)	Peak Hourly Flow (MGD)	Instantaneous Peak Flow (MGD)
0.8	1.5	2.0	2.4

2.2 WASTEWATER INFLUENT STRENGTH AND QUALITY

The following table summarizes the proposed wastewater strength for the IWRF both as concentration and as daily loading at 0.8 MGD. It is assumed that the future wastewater strength will be similar to a typical municipal treatment system since there are no future planned wet industries or industrial dischargers, or significant changes in other demographics.

Table 3 of the 2008 WWTP Annual Report provides the composite sample test results for the minerals and priority pollutant metals in the influent wastewater (see **Appendix C**). Data used to prepare **Table 2-4** was measured from July through October 2009. Loading will approximately double when flow reaches 1.6 MGD in 2030.

Table 2-4: IWRF Influent Wastewater Strength.

Parameter	Average Daily Concentration (mg/L)	Daily Loading (pounds)
Total Suspended Solids (TSS)	280	1,870
Biological Oxygen Demand (BOD)	250	1,670

2.3 WASTEWATER EFFLUENT QUALITY

The IWRF will produce disinfected tertiary effluent. The IWRF and COWRP will be joined by a forcemain originating at the IWRF and connecting to the existing forcemain at the COWRP that currently provides recycled water for irrigation of the Castle Oaks Golf Course. This system will serve as the backbone of a future water recycling system which will serve the entire Ione Valley. Construction of this pipeline will be done during the construction of the IWRF. A more detailed discussion of the facility upgrades are provided in **Section 4** of this report. The proposed IWRF effluent quality parameters are provided in **Table 2-5**.

Table 2-5: IWRF Effluent Quality.

Parameter	Units	Monthly Average (30 days)	Daily Maximum
Settleable Solids	mg/L	0.1	0.5
Nitrate - NO_3^- (as N)	mg/L	4	6
Total Nitrogen (as N) TKN+ NO_2^-+ NO_3^-	mg/L	10	15
BOD, 5-day	mg/L	10	20
Suspended Solids	mg/L	10	20
Turbidity (24 hour mean value)	NTU	<2	5
pH	unit less	6.5 to 8.4	
Total Coliform Bacteria	MPN	< 2.2 per 100 mL	

SECTION 3 - DISPOSAL SYSTEM

Currently, the Ione WWTP site has a total of seven ponds. Four of the ponds (Ponds 1 through 4) are aerated wastewater treatment ponds and the remaining three (Ponds 5 though 7) are percolation ponds. The City proposes to abandon Ponds 1 through 4 but retain existing Percolation Ponds 5 through 7. The current disposal capacity (percolation and evaporation) of existing Percolation Ponds 5 through 7 is approximately 0.75 MGD with approximately 0.2 MGD of this capacity reserved for ARSA through the end of 2011. This capacity will be reduced with the placement of XXX feet of fill along the Sutter Creek side of Ponds 5 and 6, as set forth in the Final Ione Wastewater Master Plan EIR. This means that the existing disposal system does not have sufficient capacity to meet the future anticipated 0.80 MGD flow. Therefore, the City proposes to expand the percolation pond system by constructing an additional pond, Pond 8, to increase disposal capacity. As noted above, the City plans in the future to expand its seasonal and non-seasonal water recycling program to augment the disposal capacity provided by the percolation ponds. The combined capacity of the four percolation ponds will permit the City to meet all effluent disposal needs regardless of potential recycled water demand fluctuations. Further discussion of water recycling planning is contained in the Ione Wastewater Master Plan and EIR.

3.1 PERCOLATION POND 8

Pond 8 will function similarly to existing Percolation Ponds 5 through 7 and will be located south of existing Ponds 1 through 4 and west of Pond 7. Pond 8 would be approximately 365 feet by 730 feet in size, with a maximum depth of 10 feet and a maximum water depth of 8 feet in order to maintain a minimum 2 feet of freeboard. Once Pond 8 is constructed and operational, the City would have a minimum disposal capacity of approximately 0.80 MGD. Pond 8 would tie into the existing disposal facilities (Ponds 5 through 7) through a 150-foot long, 12-inch diameter pipeline connecting to Pond 7. This pipeline already exists, and was constructed in 2001 at the same time as Pond 7 in anticipation of the future construction of Pond 8.

3.2 WATER BALANCE – IWRF

The IWRF water balance calculation for a 100-year rainfall occurrence at 0.8 MGD is provided in **Appendix D**. The disposal capacity in the water balance includes dry and wet weather inflow and infiltration (I/I). A summary of the percolation pond characteristics from the water balance is provided in **Table 3-1**.

Table 3-1: Percolation Pond Summary.

Description	Units	Ponds 5, 6, 7 and 8
Disposal Capacity (Annual including I/I)	MGD	0.92
Gross Area	acres	28
Water Surface	acres	20
Bottom Surface	acres	15.9
Maximum Water Depth	feet	8 to 12
Storage Volume	million gallons	51.3

3.3 RECYCLED WATER

The water recycling program will augment the City's, ARSA's, and Mule Creek State Prison's wastewater disposal capacity and in the future will minimize reliance on effluent disposal to the evaporation/percolation ponds. The following are benefits to having a water recycling program:

- Reducing demand for potable water
- Maximizing the beneficial uses of wastewater effluent; and
- Promoting the State's goal to recycle a total of 1,000,000 acre-feet of water per year by the year 2010.[1]

Replacement of the existing WWTP aerated treatment pond system with a tertiary treatment system that will meet the City's future 0.8 MGD flow and is the first step towards expanding Ione's current successful water recycling program. This system will be designed to accommodate future expansions to permit ultimate treatment and disposal of 1.6 MGD of flow. The proposed tertiary system will meet the Title 22 (California Code or Regulations, Division 4, Chapter 3, Section 60301 through 60355) category for "disinfected tertiary recycled water". A more detailed discussion of the tertiary treatment system is provided in **Section 4** of this report.

The next step is to identify potential recycled water users. The City is exploring the possibility of providing a supply of recycled water to the Preston Youth Facility, irrigation to open spaces and parks, cemeteries, recreation areas and agricultural/pastoral lands. In addition, Charles Howard Park and Unimin Mine are identified as the top two potential recycled water users. Since Charles Howard Park is owned and operated by the City of Ione, the City has full control of the

[1] California Health Laws Related to Recycled Water, *The Purple Book*. June 2001.

park's irrigation needs. Unimin Mine, however, is a privately-owned corporation, with whom the City is working to reach an agreement that will allow disposal of recycled water on their property. Charles Howard Park uses approximately 50 acre-feet of water annually for irrigation purposes, predominantly during the dry months. Unimin Mine currently uses approximately 350 acre-feet of water annually in its mining operations. Since the mining operations occur year - round, this makes Unimin Mine a very desirable end user for recycled water. Providing recycled water to Charles Howard Park and/or Unimin Mine will require construction of pipelines.

Additional details concerning proposed future recycled water plans are contained in the Ione Wastewater Master Plan and EIR.

SECTION 4 - PROPOSED IMPROVEMENTS

The existing City secondary WWTP is comprised primarily of four aerated treatment ponds (Ponds 1 through 4). These ponds have insufficient capacity and do not provide adequate treatment quality to meet the City's future needs. Therefore, the following improvements are proposed for the IWRF: construction of nutrient reducing treatment facilities, construction of a recycled water pump station and pipeline, operation of existing Percolation Ponds 5, 6, and 7, construction of Percolation Pond 8, and demolition/remediation of existing treatment facilities.

4.1 IONE WATER RECLAMATION FACILITY – IWRF

The majority of the proposed new treatment facilities will be located immediately south of the existing WWTP treatment ponds and outside the boundary of the existing treatment system to avoid interruption of operations. In addition to the new treatment facilities, construction of a headworks, as well as miscellaneous facilities will be included in the proposed design.

4.1.1 Headworks

The proposed wastewater headworks will consist of a wet well with multiple pumps suitable for wastewater service. The wastewater will continue through a mechanical screen(s) for removal of inorganic matter and then through a grit removal unit. The screened and de-gritted wastewater is then pumped to the activated sludge system. The screening and grit removal equipment will likely be housed in an above grade building or enclosure. To minimize odors within the building, the design will include an odor control system.

4.1.2 Treatment System

The treatment system will consist of multiple concrete aeration tank(s) built below grade or partially below grade. This system will be designed to maintain low dissolved oxygen content and to provide both biological treatment and nutrient removal. In order to separate solids or activated sludge from the effluent, the mixed liquor will be sent from the aeration tank(s) to a clarifier. The exact configuration of the treatment design will be determined during the Design-Build process. Excess activated sludge or waste activated sludge (WAS) will be sent to the biosolids management system.

The biosolids management system will consist of multiple aerobic digester tanks built below grade or partially below grade and equipment for dewatering. Anaerobic digestion is not proposed. The WAS will enter the aerobic digesters to break down and digest the solids. The sludge produced by the digestion process will then be dewatered mechanically using a screw press, belt press, or centrifuge. Filtrate from the dewatering process will be sent to the start of the aeration tanks. Dewatered sludge will be stored temporarily onsite in a loading bin before being hauled to an appropriate disposal site. At a minimum, dewatered sludge will be capable of meeting Class B biosolids based on the United States Environmental Protection Agency (EPA) guidelines and regulations for the use and disposal of sludge (40 CFR Part 503).

Provisions for future upgrade to Class A biosolids will be provided. Solids will be periodically disposed of offsite in compliance with local, State, and Federal requirements.

4.1.3 Tertiary Treatment

After clarification, effluent will undergo sent filtration and disinfection. The California Department of Health Services (DHS) has recognized several general filtration technologies that are acceptable for meeting Title 22 requirements. One of the recognized filtration technologies is proposed to reduce turbidity and separate non-settable solids from the wastewater prior to disinfection. For disinfection, DHS has recognized ultraviolet (UV) and hypochlorite as an acceptable means for meeting Title 22 requirements. The City proposes UV for disinfection of recycled water produced at the IWRF to eliminate the addition of salts and chlorinated hydrocarbons usually associated with hypochlorite disinfection or the hazardous material containment issue associated with chlorine gas. Both the filter and disinfection system will be designed such that additional units can be added in the future as demand/beneficial uses for Title 22 water increases.

4.1.4 Miscellaneous Facilities

Additional miscellaneous facilities are proposed to be constructed at the IWRF to support the operation of the activated sludge/tertiary treatment system including:

- Operations Building
- Electrical Building
- Laboratory
- Plant Water Pumping Facility
- Area Drain Pump Station
- Site Work (i.e., landscaping, paving, yard piping, etc.)
- Emergency Power

The exact configuration and design of these facilities will be finalized during the Design-Build process.

4.2 RECYCLED WATER PUMP STATION AND PIPELINE

A recycled water pump station and pipeline will be constructed to convey Title 22 effluent or recycled water from the IWRF to the existing effluent forcemain originating at the COWRP (where the pipeline crosses Five Mile Road). Currently, the forcemain provides recycled water from the COWRP to the Castle Oaks Golf Course for irrigation. The pump station will consist of a wet well containing multiple pumps designed to work in combination with the existing effluent pumps located at the COWRP. The proposed pipeline will be approximately 12 inches in diameter and accommodate flow up to approximately 3.0 MGD. The pipeline route will be constructed primarily underground and within City owned land or County roadway. The 12-inch diameter pipeline will cross Sutter Creek on the underside of the Old Stockton/File Mile Bridge. Alternatively, an existing pipeline conveying ARSA water to Percolation Pond 6 might be used depending upon its physical condition and pressure rating.

4.3 PERCOLATION PONDS

The City proposes to continue to operate Percolation Ponds 5, 6, and 7 and construct Percolation Pond 8. As discussed in **Section 3.1** of this report, the location of Pond 8 will be south of existing Ponds 1 through 4 and west of Pond 7. Pond 8 will be approximately 365 feet by 730 feet in size, with a total depth of 10 feet (maximum water depth of 8 feet plus 2 feet of freeboard). The existing Pond 7 will be connected to Pond 8 via a 12-inch diameter pipeline approximately 150 feet in length. This pipeline is an existing structure that was constructed in 2001 at the same time as Pond 7 in anticipation of the future construction of Pond 8. The condition of the pipeline is unknown and might require replacement.

4.4 DEMOLITION/REMEDIATION OF EXISTING FACILITIES

The existing WWTP aerated treatment pond system will be replaced by a tertiary treatment system that will meet the City's 0.80 MGD. Once the tertiary treatment system is operational, the aerated treatment pond system (Ponds 1 through 4) and ancillary equipment will no longer be required and will be decommissioned. The ponds will be drained and cleaned of all biosolids and debris. Removed sludge will be disposed of offsite in compliance with State requirements. The levees surrounding each pond will then be leveled and the site graded for proper drainage. The existing operations building, abandoned primary clarifier, aerobic digester, and blower building will be demolished.

4.5 PROJECT IMPLEMENTATION

The City of Ione intends to design, construct, and finance the construction of all of the proposed facilities discussed in this Report through the Design-Build contracting method and ultimately operate all City wastewater assets by contract with private industry. Therefore, design details in this report are limited since the City can only provide design and performance criteria due to the nature of the Design-Build process. For example, specific site layout, equipment selection, and operation method will not be known until a Design-Build team and design is selected.

4.5.1 Schedule

A project summary schedule for the design and construction activities for the proposed IWRF is provided in **Table 4-1**.

Table 4-1: IWRF Project Schedule.

Activity	Completion/Due Date
Certified Final Wastewater Master Plan and EIR	December 15, 2009
City Council approved short list of Design-Build Teams	January 19, 2009
Submittal of Report of Waste Discharge	March 9, 2010
Issue Request for Proposals (DBOF)	April 22, 2010
Submittal of DBOF Proposals	September 14, 2010
Notice of Award of DBOF Contract	October, 19 2010
Notice to Proceed for DBOF Contract	December 16, 2010
IWRF Complete and Fully Operational	December 30, 2011

SECTION 5 - WATER QUALITY

Amador Water Agency (AWA) provides drinking water to the City of Ione. Every year, AWA produces an Annual Consumer Confidence Report in accordance with Federal and State laws. The report provides information on the levels of contaminants in the drinking water, as well as the maximum contaminant level (MCL) allowed. **Table 5-1** displays the drinking water contaminant results, respectively, for the City's potable water supply as reported in AWA's 2008 Annual Consumer Confidence Report (see **Appendix E**).

Table 5-1: AWA Drinking Water Quality.

Detected Contaminants	Units	MCL	Result Average
Aluminum (Al)	ppb	1000	57
Arsenic (As)	ppb	50	<2.0
Color	units	15	14
Copper	ppm	1.3	0.17
Iron (Fe)	ppb	300	210
Nitrate (NO3)	ppb	10,000	<220
Specific Conductance	umhos/cm	1600	65.2[2]
Sulfate (SO4)	ppm	500	1.6
Total Dissolved Solids	ppm	500	68[2]
Total Trihalomethanes (TTHMs)	ppb	80	47.9
Turbidity	NTU	5	ND
Zinc (Zn)	ppb	5000	<5.0

[2] Data from Table 5 of the 2008 WWTP Annual Report

SECTION 6 - HYDROLOGY

The Ione WWTP Master Plan EIR contains a thorough evaluation of potential temporary and permanent environmental impacts resulting from the construction and operation of the proposed wastewater and reclamation facilities, and, when appropriate, proposed mitigation measures to reduce impacts to a less than significant level. This includes examination of the impacts resulting from the operation of the treatment plant and percolation ponds, both existing and proposed, on the shallow groundwater aquifer and on the adjacent surface water, Sutter Creek. Contained in **Appendix F** is a copy of Chapter 3, Hydrology from the Ione WWTP Master Plan EIR.

All existing and proposed facilities will be constructed above the 100-year flood plain elevation.

6.1 GROUNDWATER AQUIFER

The City proposes to continue operation of existing Percolation Ponds 5, 6, and 7 with mitigation measures applied to Pond 5 and 6 as described in the Ione WWTP Master Plan EIR. An additional Percolation Pond 8 will be constructed to provide adequate storage and disposal capacity for the treatment of 0.80 MGD. Disposal rates in the existing percolation ponds have been historically equal to greater than 0.80 MGD during wet years.

With construction of Percolation Pond 8, disposal capacity through evaporation and percolation will increase to an estimated 0.92 MGD. Disposal capacity must exceed 0.8 MGD to accommodate infiltration flow and precipitation into the ponds. Pond 8 will be constructed on the southern portion of the existing WWTP site on property owned by the City. The soil percolation rate of Pond 8 is assumed to be similar to the existing percolation ponds based upon site soil conditions.

As described in the Ione WWTP Master Plan EIR, current impacts due to the operation of the percolation ponds are less than significant. These impacts should be further reduced due to the planned higher quality effluent once the tertiary treatment and disinfection facilities are constructed and disposal of ARSA secondary effluent stops at the end of 2011.

Under some seasonal conditions the pond bottom elevations of the existing percolation ponds could result in a separation distance of less than 10-feet. This is the minimum recommended distance per Appendix 36 (Guidelines for Waste Disposal from Land Developments) of the Regional Board's Basin Plan (Regional Board, 1995). The analysis in the Ione WWTP Master Plan EIR did not identify any significant impacts as a result of a potential separation distance of less than 10-feet.

The proposed effluent quality for disposal in the percolation ponds will increase (total coliform bacteria less than 2.2 MPN per 100 milliliters) and include filtration and disinfection. UV light for disinfection is proposed to reduce salt concentrations in the effluent and eliminate the potential for the creation of trihalomethane compounds.

6.2 GROUNDWATER MONITORING

As shown in **Appendix G**, Figure 3.1-5 displays the monitoring well locations for the both the existing COWRP and WWTP. Three monitoring wells, CO-MW1 through CO-MW3 were installed in 1994 on the Castle Oaks Golf Course and are monitored quarterly. CO-MW1 is considered to be upgradient and beyond the influence of effluent reuse, whereas CO-MW2 and CO-MW3 are considered representative of the irrigation effluent at the Castle Oaks Golf Course.

At or near the WWTP, there are several monitoring wells, a number of which are equipped with dataloggers. A breakdown of these monitoring wells is listed below.

- Four monitoring wells, MW-1 through MW-4 were installed in 2002 and are monitored quarterly. MW-1 is upgradient of the percolation ponds; MW-2 is between ponds 4 through 6 and Sutter Creek; MW-3 is downgradient of the percolation ponds and MW-4 is downgradient of proposed percolation pond 8.
- Three monitoring wells, MW-5 through MW-7 were installed in June 2006 as part of a preliminary study for the proposed percolation pond 8. These wells are not actively monitored, except during the CEQA/EIR study.
- Five monitoring wells, MW-1A, MW-3A, MW4-A, MW-5A and MW-5B were installed in August 2007 to further understand local groundwater conditions. These wells are not actively monitored, except during the CEQA/EIR study.
- Six monitoring wells, MW-08-1, MW-08-2A, MW-08-2B, MW-08-3, MW-08-4A and MW-08-4B were installed in January 2009 to obtain further information on off-site hydrogeologic conditions at locations upgradient from and unaffected by the plant. These wells are not actively monitored, except during the CEQA/EIR study.

The City is not planning to install any additional monitoring wells for this proposed project. Hydrology mitigation measures required by the Ione WWTP Master Plan EIR for the project construction and facility operation are located in **Appendix G**.

6.3 ANTIDEGRADATION ANALYSIS

As part of the Ione WWTP Master Plan EIR an Anti-Degradation Analysis of the project was performed per the requirements of Resolution 68-16. This analysis was performed by Condor Earth Technologies and supplements the analysis performed by Balanced Hydrogeologic contained in Chapter 3 and Appendix D of the EIR. A copy of this analysis and conclusions are contained in **Appendix H**.

6.4 SURFACE WATER

The Ione WWTP Master Plan EIR evaluated the operation of existing Percolation Ponds 5 and 6 due to the concern about potential conductivity between the groundwater beneath the ponds and surface water in Sutter Creek. Evaluation of Ponds 1 through 4 was not necessary since they will be abandoned in the proposed project. The Ione WWTP Master Plan EIR concluded that groundwater seepage, if any, was less than significant and no mitigation is required. However, the City is proposing mitigation measures related to the operation of Percolation Ponds 5 and 6. These measures will consist of infill of the ponds within 200 feet of the Sutter

Creek. Infill of the pond will result in a drop in potential percolation volume from Pond 5 and 6 and reduce storage volume. Construction of Percolation Pond 8 will be required to replace the lost percolation and storage capacity of Pond 5 and 6.

6.5 TOTAL DISSOLVED SOLIDS

As reported in Table 6 of the 2008 existing COWRP Annual Report the total raw water total dissolved solids and specific conductance was 68 mg/L and 65.2 umhos/cm, respectively. The 2008 Ione WWTP Annual Report stated an average effluent total dissolved solids and specific conductance of 241.8 m/L and 389.5 umhos/cm, respectively. Therefore, an increase of approximately 173.8 mg/L and 324.3 umhos/cm is "added" to the wastewater during municipal use. The following table summarizes the total dissolved solids data.

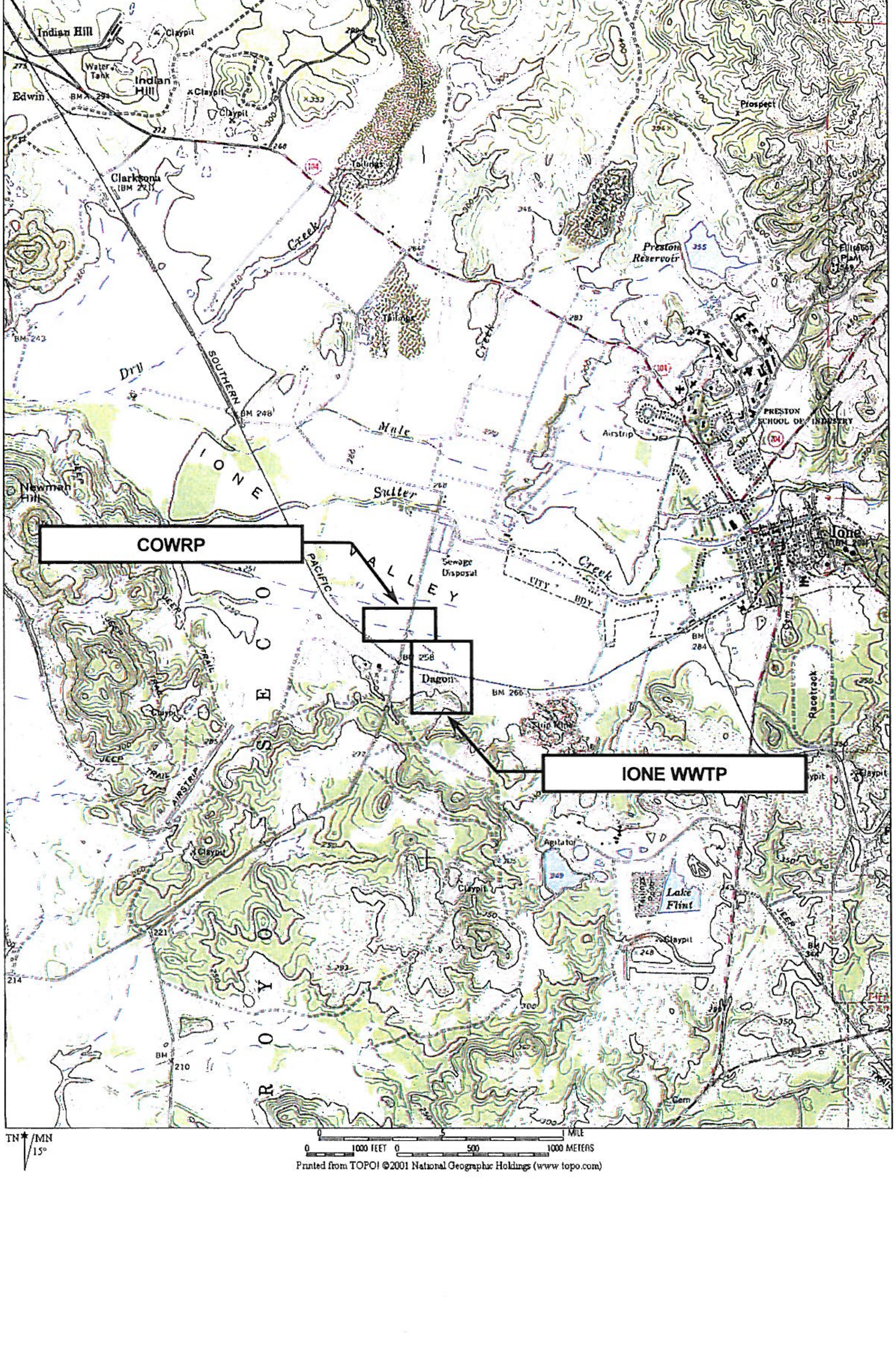
Table 6-1: Summary of Total Dissolved Solids.

Parameter	Total Dissolved Solids (mg/L)	Specific Conductance (umhos/cm)
Raw Water	68	65.2
Effluent Wastewater	241.8	389.5
Difference (Gain)	173.8	324.3

As shown in **Table 6-1**, the specific conductance in the effluent wastewater is approximately 389.5 umhos/cm, which is less than 500 umhos/cm limit specified in the Regional Board 2007 Salinity Guidance document. Since the water quality will be of higher quality after construction of the tertiary treatment system, it is anticipated that the specific conductance will remain lower than the 500 umhos/cm specific conductance limit. In addition, the discharge will likely not impair the beneficial uses of groundwater.

APPENDIX A

Site Map



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APPENDIX B

Application/Report of Waste Discharge
Form 200

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

I. FACILITY INFORMATION

A. Facility:

Name: Ione Water Reclamation Facility			
Address: 1600 West Marlette Street			
City: Ione	County: Amador	State: CA	Zip Code: 95640
Contact Person: Casey Wichert		Telephone Number: 209-274-4076	

B. Facility Owner:

Name: City of Ione			Owner Type (Check One): 1. ☐ Individual 2. ☐ Corporation
Address: 1 East Main Street			3. ☑ Governmental Agency 4. ☐ Partnership
City: Ione	State: CA	Zip Code: 95640	5. ☐ Other:
Contact Person: Kimberly Kerr, City Manager		Telephone Number: 209-274-2412	Federal Tax ID: 946017629

C. Facility Operator (The agency or business, not the person):

Name: Perc Water			Operator Type (Check One): 1. ☐ Individual 2. ☐ Corporation
Address: 5250 Claremont Avenue, Suite 234			3. ☐ Governmental Agency 4. ☐ Partnership
City: Stockton	State: CA	Zip Code: 95207	5. ☑ Other: Sole service provider
Contact Person: Casey Wichert		Telephone Number: 209-472-3642	

D. Owner of the Land:

Name: Same as Owner			Owner Type (Check One): 1. ☐ Individual 2. ☐ Corporation
Address:			3. ☑ Governmental Agency 4. ☐ Partnership
City:	State: CA	Zip Code: 95640	5. ☐ Other:
Contact Person:		Telephone Number: 209-274-2412	

E. Address Where Legal Notice May Be Served:

Address: Same as Owner		
City:	State: CA	Zip Code: 95640
Contact Person:		Telephone Number: 209-274-2412

F. Billing Address:

Address: Same as Owner		
City:	State: CA	Zip Code: 95640
Contact Person:		Telephone Number: 209-274-2412

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application (A or B):

☑ **A. WASTE DISCHARGE TO LAND** ☐ **B. WASTE DISCHARGE TO SURFACE WATER**

Check all that apply:

☑ Domestic/Municipal Wastewater Treatment and Disposal	☐ Animal Waste Solids	☐ Animal or Aquacultural Wastewater
☐ Cooling Water	☐ Land Treatment Unit	☐ Biosolids/Residual
☐ Mining	☐ Dredge Material Disposal	☐ Hazardous Waste (see instructions)
☐ Waste Pile	☐ Surface Impoundment	☐ Landfill (see instructions)
☑ Wastewater Reclamation	☐ Industrial Process Wastewater	☐ Storm Water

☐ Other, please describe: ____________________

III. LOCATION OF THE FACILITY

Describe the physical location of the facility.

1. Assessor's Parcel Number(s)	2. Latitude	3. Longitude
Facility:	Facility: W120 57' 30"	Facility: N38 21' 14"
Discharge Point:	Discharge Point: Same	Discharge Point: Same

IV. REASON FOR FILING

☐ New Discharge or Facility
☐ Changes in Ownership/Operator (see instructions)
☑ Change in Design or Operation
☑ Waste Discharge Requirements Update or NPDES Permit Reissuance
☑ Change in Quantity/Type of Discharge
☐ Other: ____________________

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency: City of Ione

Has a public agency determined that the proposed project is exempt from CEQA? ☐ Yes ☑ No

If Yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below.

Basis for Exemption/Agency: ____________________

Has a "Notice of Determination" been filed under CEQA? ☐ Yes ☑ No

If Yes, enclose a copy of the CEQA document, Environmental Impact Report, or Negative Declaration. If no, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents:

☑ **EIR** ☐ **Negative Declaration**

Expected CEQA Completion Date: December 15, 2009

APPENDIX C

IWRF Influent Minerals and Priority Pollutant Metals 2007 - 2008

TABLE 3
CITY OF IONE
INFLUENT/EFFLUENT MINERALS and PPRIORITY POLLUTANT METALS 2007-2008

	Influent Composite	Effluent Grab	Percent Removal	Influent Grab	Effluent Grab	Percent Removal
Parameter	11/13/07	11/14/07		12/30/08	12/30/08	
Hardness (mg/L)	33	41	NC	32	43	NC
Alkalinity, Bicarbonate (mg/L)	115	5.6	95%	110	112	-2%
Alkalinity, Carbonate (mg/L)	<5.0	<5.0	NC	<5.0	<5.0	NC
Alkalinity, Hydroxide (mg/L)	<5.0	<5.0	NC	<5.0	<5.0	NC
Alkalinity, Total (mg/L)	115	5.6	95%	110	112	-2%
Solids, Total Suspended (mg/L)	141	24	83%	192	40	79%
Solids, Volatile Suspended (mg/L)	119	23	81%	172	33	81%
BOD (mg/L)	188	29	85%	195	28	86%
COD (mg/L)	347	52	85%	227	117	48%
Chloride (mg/L)	26	30	NC	21	28	NC
Phosphate, Total P (mg/L)	5.3	2.2	58%	5.2	4.0	23%
Sulfate (mg/L)	16	23	NC	11	20	NC
Calcium (mg/L)	12	12	NC	6.3	11	NC
Potassium (mg/L)	9.4	9.3	1%	8.2	11	-34%
Aluminum (mg/L)	1.3	0.086	93%	2.03	0.123	94%
Antimony (mg/L)	NA	NA		<0.005	<0.005	NC
Arsenic (mg/L)	<0.002	0.0024	NC	<0.004	<0.001	NC
Barium (mg/L)	<0.050	<0.050	NC	<0.050	<0.050	NC
Berrylium (mg/L)	NA	NA		<0.001	<0.001	NC
Boron (mg/L)	0.22	0.25	NC	0.095	0.19	NC
Cadmium (mg/L)	<0.001	<0.001	NC	<0.001	<.00025	NC
Chromium (mg/L)	<0.002	<0.002	NC	<0.002	<0.002	NC
Copper (mg/L)	0.035	0.0051	85%	0.029	0.0074	74%
Iron (mg/L)	0.5	0.2	60%	0.373	0.264	29%
Lead (mg/L)	NA	NA		0.001	<.0005	NC
Magnesium (mg/L)	<2.0	2.7	NC	4.0	3.8	NC
Manganese (mg/L)	0.064	0.098	NC	0.042	0.063	NC
Mercury (mg/L)	<0.001	<0.001	NC	<0.001	<0.001	NC
Nickel (mg/L)	<0.005	<0.005	NC	<0.005	<0.005	NC
Selenium (mg/L)	NA	NA		<0.002	<0.002	NC
Silver (mg/L)	<0.002	<0.002	NC	<0.002	<0.001	NC
Thallium (mg/L)	NA	NA		<0.001	<0.001	NC
Zinc (mg/L)	0.27	0.026	90%	0.336	0.038	89%

NC: Not Calculated
NA: Not Analyzed

TABLE 1
City of Ione Wastewater Treatment Plant
Sample Data, Monthly Averages 2008

Month	Influent Flow MGD	Influent BOD (mg/L)	Influent TSS (mg/L)	Pond 4 Effluent BOD (mg/L)	Pond 4 Effluent Total Dissolved Solids (mg/L)	Pond 4 Effluent EC umhos/cm	Pond 4 Effluent Sodium (mg/L)	Pond 4 Effluent Chloride (mg/L)	Pond 4 Effluent Nitrate-N (mg/L)	Pond 4 Effluent TKN (mg/L)	Pond 4 Effluent pH (SU)	ARSA Flow to Pond 6 Acre-ft
January-08	0.412	159	151	21	201	410	30	25	1.1	21	7.8	0.93
February-08	0.356	247	235	22	214	395	29	25	1.3	18	8.0	0.00
March-08	0.309	233	181	26	251	430	35	31	1.5	21	7.7	23.72
April-08	0.327	208	187	14	262	528	39	38	2.3	25	7.9	3.65
May-08	0.336	236	394	116	260	470	43	38	3.3	14	8.3	8.32
June-08	0.334	294	628	32	228	341	42	36	3.6	8	7.2	15.74
July-08	0.333	134	43	16	237	367	45	44	3.6	7	8.6	0.00
August-08	0.341	NS	NS	20	NS	NS	49	50	5.4	8	7.6	0.00
September-08	0.345	251	219	23	241	348	42	42	6.2	8	7.7	12.57
October-08	0.321	220	250	27	229	306	40	34	5.6	9	7.5	0.00
November-08	0.318	242	280	28	288	306	35	34	9.9	6	7.0	0.00
December-08	0.324	250	220	34	249	383	38	30	4.6	16	7.3	0.00
Annual Daily Average Flow Through Treatment (MGD):	0.338	NS: Not Sampled										
Maximum Daily Average Flow (MGD):	0.412	ADWF (MGD):	0.335									
Minimum Daily Average Flow (MGD):	0.309	(May Through October)										
Total Annual Flow (MG):	123.3	Combined City of Ione Annual Daily Average Flow To Disposal (MGD):			0.396							
Total Annual Flow To Disposal, City of Ione + ARSA (MG):	144.5											
Average:		224.8	253.5	31.6	241.8	389.5	38.9	35.5	4.0	13.3	7.7	5.4
Maximum:		294.0	628.0	116.0	288.0	528.0	49.3	50.2	9.9	24.5	8.6	23.7
Minimum:		134.0	43.0	14.0	201.0	306.0	29.0	25.0	1.1	6.1	7.0	0.0
Total:												64.9

APPENDIX D

IWRF Water Balance Calculations

CITY OF IONE - Future Water Balance with the Construction of Pond 8
100 YEAR PRECIPITATION

INPUT DATA

DISPOSAL PONDS Modified 5, Modified 6, 7, 8				CLIMATILOGICAL FACTORS	
GROSS AREA (AC)	26.2			PRECIP/AVG PRECIP RATIO	1.91
WATER SURFACE (AC)	18.7	**DESIGN CAPACITY (ADWF)**	**0.800**	OCT-APR EVAP/AVG EVAP RATIO	0.77
BOTTOM SURFACE (AC)	14.7	INFILTRATION/INFLOW (MG/MGD)	53.0	MAY-SEP EVAP/AVG EVAP RATIO	1.00
FULL DEPTH (FT) (AVERAGE)	8-12	AVG. POND PERC. RATE CM/YR	1752	PAN COEFFICIENT	0.80
STORAGE AVAILABLE 5, 6, 7, 8 (MG)	48.2	AVG. POND PERC. RATE IN/YR	689.8	LAND PRECIP COLLECTED (FRAC)	1.0

PARAMETER / MONTH	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ANNUAL
DAYS IN MONTH	31	30	31	31	28	31	30	31	30	31	31	30	365
AVG PAN EVAP (IN)	5.33	2.52	1.40	1.48	1.93	3.71	5.36	7.96	9.81	12.09	10.95	8.21	70.75
AVG PRECIP (IN)	1.26	2.82	3.34	4.16	3.40	3.49	1.89	0.86	0.24	0.06	0.08	0.39	21.99
ETo	3.72	1.80	0.93	1.24	1.96	3.10	4.80	6.51	7.80	8.99	7.75	5.70	54.30
PERCOLATION (IN)	58.6	56.7	58.6	58.6	52.9	58.6	56.7	58.6	56.7	58.6	58.6	56.7	689.8
INFLUENT (ADWF)	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	
PRECIPITATION I/I (MGD/MG)	2.43	5.44	6.44	8.02	6.56	6.73	3.64	1.66	0.46	0.12	0.15	0.75	42.4
PRECIPITATION I/I (MGD)	0.08	0.18	0.21	0.26	0.23	0.22	0.12	0.05	0.02	0.00	0.00	0.03	0.12
INFLUENT- ADJUSTED (MGD)	0.88	0.98	1.01	1.06	1.03	1.02	0.92	0.85	0.82	0.80	0.80	0.83	**0.917**
MONTHLY FLOW VARIATION MODELED (VS. ADWF)	109.8%	122.7%	126.0%	132.3%	129.3%	127.1%	115.2%	106.7%	101.9%	100.5%	100.6%	103.1%	

CALCULATIONS	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ANNUAL
PRECIPITATION (IN)	2.4	5.4	6.4	7.9	6.5	6.7	3.6	1.6	0.5	0.1	0.2	0.7	42.0
EVAPORATION (IN)	3.3	1.6	0.9	0.9	1.2	2.3	3.3	6.4	7.8	9.7	8.8	6.6	52.6
PERCOLATION (IN)	58.58	56.69	58.58	58.58	52.91	58.58	56.69	58.58	56.69	58.58	58.58	56.69	689.8
WATER TO PONDS													
WASTEWATER VOLUME (MG)	27.2	29.4	31.2	32.8	29.0	31.5	27.6	26.5	24.5	24.9	25.0	24.8	334.4
ADDITIONAL ARSA/PRISON WATER (MG)	0.00	0.00	0.00	0.00	0.00	0.00	17.00	17.00	34.00	34.00	34.00	34.00	170.0
PRECIPITATION VOLUME INTO PONDS (MG)	1.7	3.8	4.5	5.7	4.6	4.7	2.6	1.2	0.3	0.1	0.1	0.5	29.9
TOTAL INFLOW (MG)	28.94	33.27	35.78	38.47	33.58	36.27	47.21	44.63	58.79	59.00	59.06	59.28	**534.3**
DISPOSAL PONDS													
PERC VOLUME (MG)	29.77	28.81	29.77	29.77	26.89	29.77	28.81	29.77	28.81	29.77	29.77	28.81	350.5
EVAP. VOLUME PONDS (5, 6, 7, & 8) (MG)	1.67	0.79	0.44	0.46	0.60	1.16	1.68	3.24	3.99	4.91	4.45	3.34	26.7
POND (5, 6, 7, & 8) DISPOSAL POTENTIAL (MG)	31.44	29.60	30.21	30.23	27.49	30.93	30.49	33.00	32.80	34.68	34.22	32.15	**377.2**
STORAGE													
BEGINNING POND STORAGE VOLUME (MG)	**2.5**	0.0	3.7	9.2	17.5	23.6	28.9	28.6	23.3	15.3	5.6	0.0	
STORAGE GAIN IN DISPOSAL PONDS (MG)	-2.5	3.7	5.6	8.2	6.1	5.3	-0.3	-5.4	-8.0	-9.7	-9.2	-6.9	
FINAL STORAGE VOLUME IN DISPOSAL PONDS (MG)	0.0	3.7	9.2	17.5	23.6	28.9	28.6	23.3	15.3	5.6	0.0	**0.0**	

MAXIMUM STORAGE REQUIRED (MG).......... **29**
TOTAL AVAILABLE STORAGE (MG).......... **48**

SUMMARY

ANNUAL INFLOW (MG)		ANNUAL OUTFLOW POTENTIAL (MG)		OVERALL BALANCE	
WASTEWATER+ SUPP. WATER..........	462	EVAPORATION..........	27	UNUSED DISPOSAL CAPACITY (MG)..........	**13**
INFLOW AND INFILTRATION..........	42	PERCOLATION..........	351	(MUST NOT BE NEGATIVE)	
PRECIPITATION INTO ALL PONDS..........	30	IRRIGATION..........	170	UNUSED STORAGE CAPACITY (MG)..........	**19**
TOTAL	**534**	**TOTAL**	**547**	(MUST NOT BE NEGATIVE)	

Percolation Pond System

	Units	Ponds 5, 6, and 7	Ponds 5, 6, 7 and Pond 8	Ponds 5, 6, 7 and Ponds 8-9
Disposal Capacity (Annual)	Million gallons per day	0.6	0.9	1.25
Water Surface	Acres	13.0	18.7	27
Bottom Surface	Acres	10.5	14.7	21.3
Maximum Water Depth	Feet	8-12	8-12	8-12
Storage Volume	Million gallons	35	48.2	67.3

Modified Pond 5

Water Surface	Acres	4.1
Bottom Surface	Acres	3.1
Maximum Water Depth	Feet	12.0
Storage Volume	Million gallons	14.1

Modified Pond 6

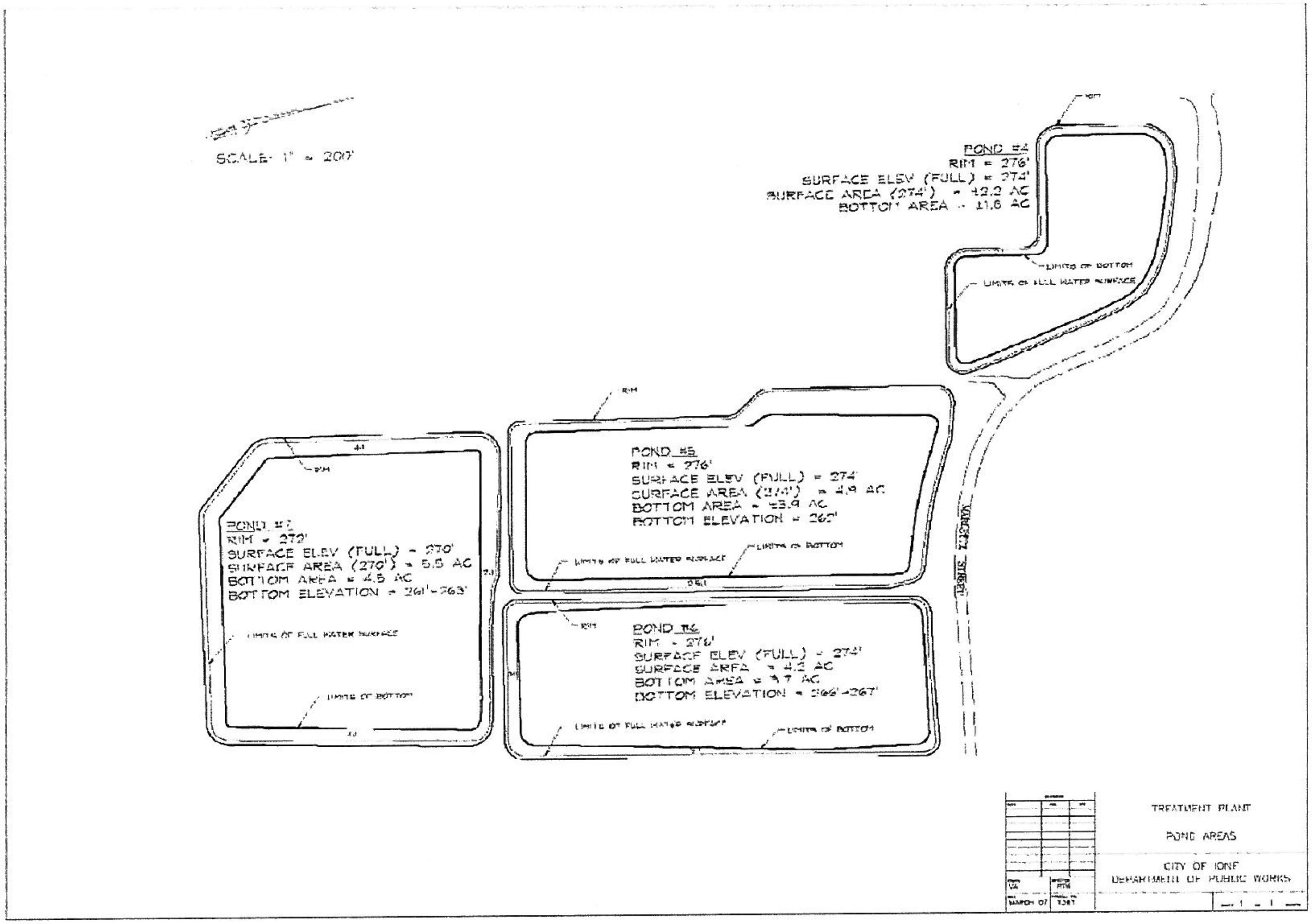
Water Surface	Acres	3.4
Bottom Surface	Acres	2.9
Maximum Water Depth	Feet	8.0
Storage Volume	Million gallons	8.2

Pond 7

Water Surface	Acres	5.5
Bottom Surface	Acres	4.5
Maximum Water Depth	Feet	8.0
Storage Volume	Million gallons	13.0

Pond 8

Water Surface	Acres	5.7
Bottom Surface	Acres	4.2
Maximum Water Depth	Feet	8.0
Storage Volume	Million gallons	12.9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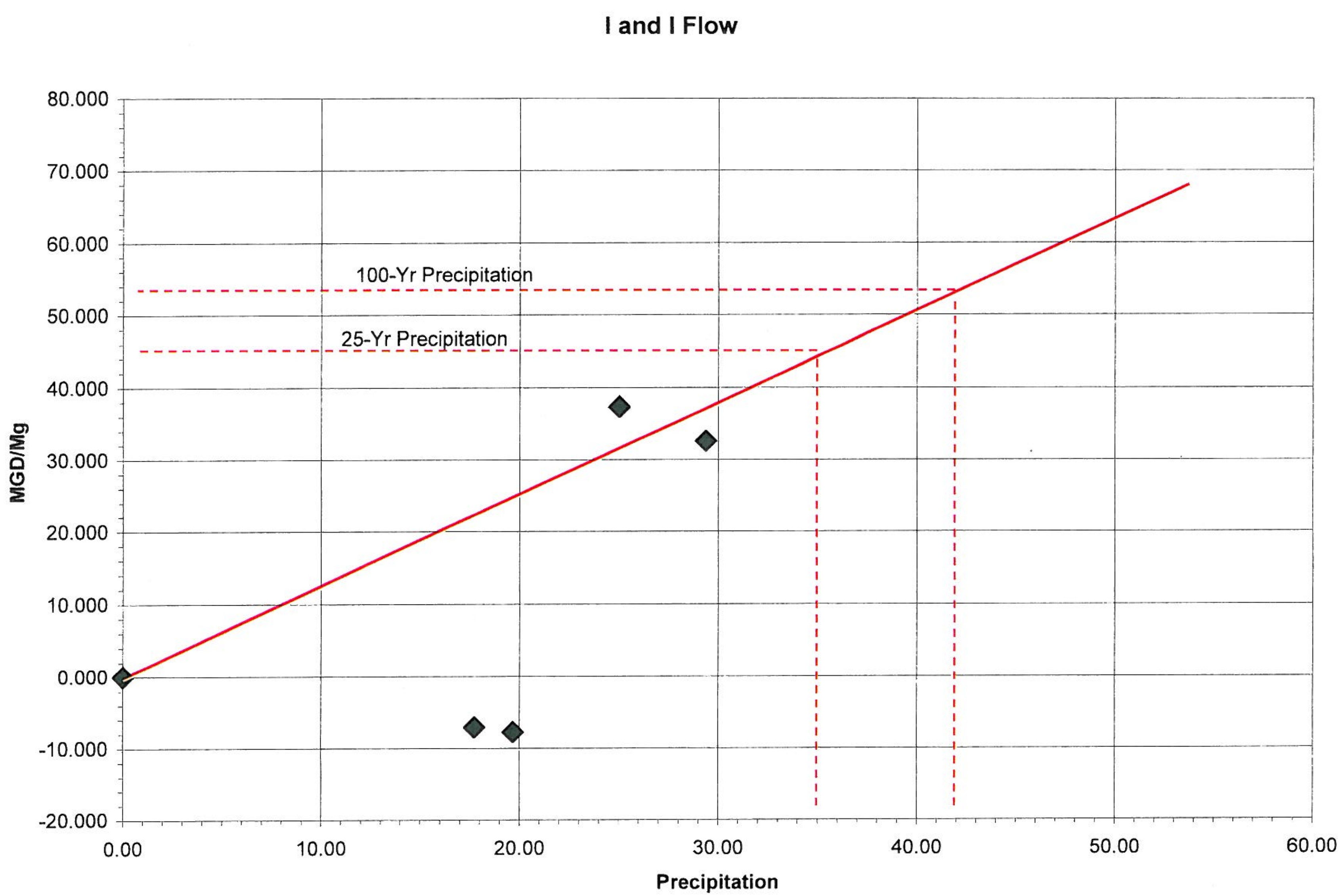
POND #4
RIM = 276'
SURFACE ELEV (FULL) = 274'
SURFACE AREA (274') = 12.2 AC
BOTTOM AREA = 11.6 AC
LIMITS OF BOTTOM
LIMITS OF FULL WATER SURFACE
POND #5
RIM = 276'
SURFACE ELEV (FULL) = 274'
SURFACE AREA (274') = 4.9 AC
BOTTOM AREA = ±3.9 AC
BOTTOM ELEVATION = 262'
POND #6
RIM = 276'
SURFACE ELEV (FULL) = 274'
SURFACE AREA = 4.2 AC
BOTTOM AREA = 3.7 AC
BOTTOM ELEVATION = 266'-267'
POND #7
RIM = 272'
SURFACE ELEV (FULL) = 270'
SURFACE AREA (270') = 5.5 AC
BOTTOM AREA = 4.5 AC
BOTTOM ELEVATION = 261'-263'
RIM
STREET
TREATMENT PLANT
POND AREAS
CITY OF IONE
DEPARTMENT OF PUBLIC WORKS
MARCH 07


I and I Flow
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.000
-10.000
-20.000
MGD/Mg
0.00
10.00
20.00
30.00
40.00
50.00
60.00
Precipitation
100-Yr Precipitation
25-Yr Precipitation

YEAR	MONTHS	DAYS	RAINFALL, IN	FLOW, MGD	FLOW, MG	AVG FLOW, MGD	TOTAL FLOW, MG	ADWF, MGD	ADWF MG	PREP. DEP. I/I MG	NORMALIZED I/I MG/MGD
	JAN	31	2.07	0.431	13.38						
	FEB	28	5.63	0.459	12.85						
	MAR	31	0.93	0.430	13.35						
	APR	30	0.18	0.401	12.03						
	MAY	31	0.22	0.445	13.79						
	JUN	30	0.00	0.453	13.60						
	JUL	31	0.00	0.445	13.81						
	AUG	31	0.00	0.459	14.24						
	SEP	30	0.52	0.457	13.70						
	OCT	31	3.72	0.404	12.53						
	NOV	30	2.04	0.398	11.93						
	DEC	31	4.36	0.433	13.41						
			19.67	**0.435**		0.435	158.6041	0.444	162.0423	-3.43827	**-7.745**

YEAR	MONTHS	DAYS	RAINFALL, IN	FLOW, MGD	FLOW, MG	AVG FLOW, MGD	TOTAL FLOW, MG	ADWF, MGD	ADWF MG	PREP. DEP. I/I MG	NORMALIZED I/I MG/MGD
2003	JAN	31	0.71	0.374	11.61						
	FEB	28	1.40	0.364	10.20						
	MAR	31	1.53	0.380	11.78						
	APR	30	5.00	0.405	12.15						
	MAY	31	0.59	0.380	11.78						
	JUN	30	0.00	0.398	11.94						
	JUL	31	0.00	0.398	12.33						
	AUG	31	0.40	0.408	12.63						
	SEP	30	0.02	0.410	12.30						
	OCT	31	0.00	0.426	13.21						
	NOV	30	1.82	0.389	11.66						
	DEC	31	6.26	0.411	12.76						
			17.73			0.395	144.353	0.403	147.1995	-2.84646	**-7.058**

YEAR	MONTHS	DAYS	RAINFALL, IN	FLOW, MGD	FLOW, MG	AVG FLOW, MGD	TOTAL FLOW, MG	ADWF, MGD	ADWF MG	PREP. DEP. I/I MG	NORMALIZED I/I MG/MGD
	JAN	31	5.60	0.563	17.44						
	FEB	28	3.16	0.457	12.79						
	MAR	31	5.53	0.553	17.14						
	APR	30	1.12	0.442	13.25						
	MAY	31	2.20	0.393	12.18						
	JUN	30	1.47	0.444	13.31						
	JUL	31	0.00	0.410	12.70						
	AUG	31	0.00	0.404	12.54						
	SEP	30	0.40	0.389	11.67						
	OCT	31	0.23	0.367	11.38						
	NOV	30	0.78	0.338	10.14						
	DEC	31	8.88	0.482	14.94						
			29.37	**0.437**	**159.47**	0.437	159.4734	0.401	146.399	13.07443	**32.597**

YEAR	MONTHS	DAYS	RAINFALL, IN	FLOW, MGD	FLOW, MG	AVG FLOW, MGD	TOTAL FLOW, MG	ADWF, MGD	ADWF MG	PREP. DEP. I/I MG	NORMALIZED I/I MG/MGD
	JAN	31	4.89	0.508	15.76						
	FEB	28	1.64	0.423	11.84						
	MAR	31	8.04	0.559	17.33						
	APR	30	7.44	0.576	17.29						
	MAY	31	1.33	0.388	12.03						
	JUN	30	0.00	0.391	11.73						
	JUL	31	0.00	0.395	12.25						
	AUG	31	0.00	0.390	12.10						
	SEP	30	0.00	0.390	11.69						
	OCT	31	0.32	0.372	11.54						
	NOV	30	1.36	0.369	11.06						
	DEC	31	0.00	0.367	11.37						
			25.02	**0.427**	**155.99**	0.427	155.99	0.388	141.5056	14.48061	**37.351**

Monthly Rainfall at Camp Pardee

DWR # B20 1428 00 | Calaveras County | Latitude 38.250°
Analysis By DWR DLA | | Longitude -120.844°
Data From : Climatological Data | 5N/10E-35C | Elevation 658 Feet

Year	Sum	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1927	23.23	1.61	6.32	1.14	4.03	5.52	1.91	1.87	0.25	0.39	0.00	0.00	0.19
1928	20.46	2.09	3.38	2.75	1.85	2.36	6.04	1.88	0.03	0.07	0.00	0.00	0.00
1929	17.68	0.05	3.97	2.90	2.31	1.90	2.99	1.61	0.12	1.83	0.00	0.00	0.00
1930	15.50	0.17	0.00	2.69	5.05	2.90	2.47	1.27	0.64	0.00	0.00	0.16	0.15
1931	12.69	0.54	1.81	0.06	3.84	2.42	1.73	1.02	0.85	0.42	0.00	0.00	0.00
1932	21.15	0.64	2.67	6.92	2.31	4.91	1.08	1.09	1.53	0.00	0.00	0.00	0.00
1933	12.80	0.00	0.63	2.21	4.80	1.16	2.32	0.24	1.31	0.05	0.00	0.00	0.08
1934	17.17	1.67	0.03	7.00	1.70	4.80	0.04	0.02	1.18	0.29	0.00	0.00	0.44
1935	21.92	0.91	3.64	2.63	4.09	1.12	3.58	5.90	0.04	0.00	0.01	0.00	0.00
1936	29.96	1.09	1.21	2.22	6.47	13.86	1.97	1.36	0.57	1.16	0.02	0.00	0.03
1937	26.76	1.21	0.00	4.58	4.37	7.14	7.29	1.60	0.12	0.45	0.00	0.00	0.00
1938	27.32	0.67	2.86	3.41	3.68	8.21	6.40	1.70	0.28	0.00	0.00	0.00	0.11
1939	15.27	1.77	0.56	1.54	2.70	2.44	3.10	0.45	1.84	0.02	0.00	0.00	0.85
1940	22.91	0.86	0.42	1.10	8.62	6.12	4.78	0.83	0.19	0.00	0.00	0.00	0.00
1941	22.15	1.04	0.81	5.66	3.27	3.21	4.14	3.70	0.27	0.00	0.00	0.00	0.04
1942	24.89	0.48	1.54	5.70	6.77	2.65	1.87	3.82	2.03	0.00	0.00	0.00	0.03
1943	26.57	0.07	5.21	2.63	6.12	3.05	6.85	2.41	0.06	0.17	0.00	0.00	0.00
1944	16.98	0.81	0.76	1.97	3.05	5.16	1.55	2.48	0.83	0.07	0.00	0.00	0.30
1945	21.92	1.43	5.90	2.54	0.41	4.69	4.10	0.84	0.53	1.44	0.04	0.00	0.00
1946	20.13	2.59	4.24	4.96	0.99	2.02	3.17	0.24	1.73	0.00	0.00	0.00	0.19
1947	12.92	0.97	3.65	1.74	1.07	1.32	3.03	0.56	0.19	0.39	0.00	0.00	0.00
1948	21.74	3.01	1.67	1.28	1.01	2.44	4.79	4.77	2.73	0.04	0.00	0.00	0.00
1949	15.47	0.69	0.51	3.49	1.84	2.63	5.15	0.00	1.07	0.00	0.00	0.09	0.00
1950	17.04	0.02	1.60	1.33	5.90	2.84	2.96	1.39	0.47	0.06	0.00	0.00	0.47
1951	27.14	3.30	6.52	5.47	5.31	2.84	1.69	1.01	1.00	0.00	0.00	0.00	0.00
1952	27.76	1.57	4.08	5.57	5.57	2.92	4.72	1.81	0.32	0.14	0.02	0.00	1.03
1953	16.81	0.00	1.60	5.30	3.39	0.04	2.38	2.75	0.48	0.87	0.00	0.00	0.00
1954	16.20	1.18	1.75	1.73	2.69	1.71	4.38	1.82	0.49	0.45	0.00	0.00	0.00
1955	18.66	0.03	2.36	4.96	5.16	1.97	0.31	3.23	0.59	0.00	0.00	0.00	0.05
1956	25.15	0.20	1.69	9.97	6.48	1.96	0.15	1.85	2.63	0.00	0.00	0.00	0.22
1957	17.52	1.48	0.00	1.36	2.47	2.72	4.55	1.96	2.77	0.07	0.00	0.00	0.14
1958	28.99	1.08	0.86	3.10	4.42	5.45	7.62	5.27	1.05	0.01	0.00	0.00	0.13
1959	14.28	0.03	0.39	0.92	4.53	4.45	0.96	0.95	0.08	0.00	0.00	0.00	1.97
1960	13.13	0.00	0.00	0.83	3.58	3.61	3.09	1.79	0.12	0.00	0.00	0.00	0.11
1961	13.41	0.23	3.54	0.78	2.12	1.46	2.39	1.76	0.90	0.05	0.00	0.06	0.12
1962	17.75	0.16	1.76	1.68	1.61	8.36	2.95	0.98	0.13	0.02	0.10	0.00	0.00
1963	25.06	4.71	0.90	3.25	1.25	4.50	4.23	4.97	0.98	0.04	0.00	0.00	0.23
1964	16.48	2.43	4.78	0.38	3.95	0.22	1.57	0.62	1.49	0.88	0.00	0.01	0.15
1965	24.99	2.78	3.67	9.27	2.30	0.80	2.01	3.25	0.02	0.00	0.00	0.84	0.05
1966	14.67	0.41	4.31	3.56	2.58	2.20	0.48	0.73	0.33	0.00	0.06	0.00	0.01
1967	31.68	0.00	4.24	4.71	7.76	0.53	5.34	7.55	0.43	1.07	0.00	0.00	0.05
1968	18.21	0.92	3.03	2.46	4.93	2.56	3.19	0.42	0.40	0.00	0.00	0.30	0.00

Monthly Rainfall at Camp Pardee

DWR # B20 1428 00 — Calaveras County — Latitude 38.250°
Analysis By DWR DLA — Longitude -120.844°
Data From : Climatological Data — 5N/10E-35C — Elevation 658 Feet

Year	Sum	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1969	30.83	1.19	4.45	3.98	8.41	7.43	2.31	2.98	0.00	0.04	0.00	0.00	0.04
1970	22.07	1.84	2.49	4.30	6.70	1.62	3.19	1.57	0.00	0.32	0.00	0.00	0.05
1971	21.61	1.02	6.48	5.78	1.46	0.65	4.20	0.76	0.74	0.30	0.00	0.00	0.22
1972	16.15	0.27	2.61	6.72	1.14	1.91	0.25	1.64	0.10	0.12	0.00	0.00	1.38
1973	27.24	0.35	4.69	2.76	7.37	7.15	4.18	0.52	0.04	0.00	0.00	0.00	0.18
1974	30.45	3.88	5.08	6.28	3.47	1.41	4.59	3.30	0.00	0.81	1.63	0.00	0.00
1975	20.30	1.66	1.42	1.77	1.33	4.58	5.89	2.10	0.09	0.04	0.09	1.31	0.01
1976	10.03	2.80	1.04	0.43	0.31	1.64	1.07	1.41	0.19	0.01	0.00	1.04	0.09
1977	7.27	0.02	1.17	0.17	1.18	1.28	1.45	0.10	1.45	0.00	0.01	0.00	0.44
1978	29.25	0.02	1.70	5.01	6.90	3.13	5.54	5.22	0.10	0.02	0.00	0.00	1.61
1979	21.26	0.00	3.34	1.21	5.53	7.07	2.54	1.08	0.28	0.00	0.11	0.05	0.05
1980	25.16	1.92	3.42	2.75	6.45	5.12	2.23	1.56	0.62	0.04	1.05	0.00	0.00
1981	16.56	0.18	0.37	1.65	5.69	1.21	5.77	1.24	0.31	0.00	0.00	0.00	0.14
1982	38.06	2.28	6.50	3.96	5.20	4.08	7.24	4.88	0.43	0.17	0.03	0.00	3.29
1983	43.14	4.32	5.99	4.62	7.29	4.68	10.24	4.06	1.00	0.15	0.00	0.07	0.72
1984	23.69	1.11	8.43	7.20	0.31	3.28	1.96	0.95	0.20	0.21	0.01	0.03	0.00
1985	18.26	2.41	5.31	1.90	1.15	1.76	4.57	0.09	0.00	0.28	0.00	0.08	0.71
1986	32.96	1.19	4.45	2.53	3.11	10.03	6.27	1.54	0.50	0.00	0.00	0.00	3.34
1987	12.48	0.17	0.52	1.38	2.42	3.37	4.42	0.10	0.10	0.00	0.00	0.00	0.00
1988	13.85	1.15	1.58	2.82	3.27	0.59	0.61	3.01	0.68	0.14	0.00	0.00	0.00
1989	17.29	0.00	3.15	2.94	1.13	1.74	5.00	0.68	0.03	0.01	0.00	0.12	2.49
1990	18.33	2.74	1.73	0.00	4.57	2.91	1.80	1.99	2.55	0.01	0.03	0.00	0.00
1991	18.89	0.22	0.93	1.06	0.50	1.55	11.39	.0.80	0.69	1.46	0.00	0.29	0.00
1992	16.22	2.51	0.53	1.74	1.66	5.86	2.71	0.59	0.00	0.56	0.06	0.00	0.00
1993	30.36	1.03	0.25	6.36	8.02	6.74	4.15	1.04	1.75	1.02	0.00	0.00	0.00
1994	15.80	0.20	2.89	2.64	2.47	3.95	0.20	2.09	1.05	0.00	0.00	0.00	0.31
1995	35.90	0.73	3.61	3.61	10.51	0.65	9.06	3.63	2.58	1.52	0.00	0.00	0.00
1996	26.34	0.00	0.25	5.12	5.14	4.55	3.25	2.28	5.70	0.03	0.00	0.00	0.02
1997	24.35	1.32	4.25	8.43	8.25	0.62	0.20	0.62	0.20	0.36	0.00	0.10	0.00
1998	39.55	1.85	3.96	2.12	8.73	9.97	4.39	3.38	4.72	0.19	0.01	0.00	0.23
1999	20.98	0.59	3.16	2.12	4.95	6.16	2.06	1.09	0.54	0.28	0	0.03	0
2000	25.45	0.44	3.27	0.37	6.28	8.58	1.36	1.75	2.50	0.40	0.00	0.00	0.50
2001													
Avg	21.66	1.14	2.67	3.26	4.02	3.63	3.51	1.92	0.84	0.26	0.04	0.06	0.31
Max	43.14	4.71	8.43	9.97	10.51	13.86	11.39	7.55	5.70	1.83	1.63	1.31	3.34
Min	7.27	0.00	0.00	0.00	0.31	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Count	74	74	74	74	74	74	74	74	74	74	74	74	74
Stdev	7.08	1.10	1.99	2.25	2.44	2.67	2.36	1.55	1.06	0.42	0.22	0.22	0.68
CV	0.327	0.968	0.745	0.690	0.608	0.737	0.673	0.809	1.259	1.643	5.048	3.521	2.191
Reg CV	0.339	1.261	0.873	0.762	0.707	0.787	0.702	0.993	1.388	1.975	3.789	3.112	2.439
Reg Skew	0.5	1.5	1.3	1.3	1.0	1.0	1.0	1.4	1.8	2.7	4.4	4.1	3.3

1.14
2.67
3.26
4.02
3.63
3.51
1.92
0.84
0.26
0.04
0.06
0.31

Monthly Rainfall at Camp Pardee

DWR # B20 1428 00 — Calaveras County — Latitude 38.250°
Analysis By DWR DLA — Longitude -120.844°
Data From : Climatological Data — 5N/10E-35C — Elevation 658 Feet

Year	Sum	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Dry Years													
RP 1000	4.04	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
RP 200	6.18	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
RP 100	7.30	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
RP 50	8.61	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
RP 40	9.45	.00	.00	.03	.00	.00	.00	.00	.00	.00	.00	.00	.00
RP 25	10.15	.00	.00	.18	.14	.00	.14	.00	.00	.00	.00	.00	.00
RP 20	10.71	.00	.00	.26	.28	.00	.26	.00	.00	.00	.00	.00	.00
RP 10	12.73	.00	.19	.62	.81	.41	.73	.00	.00	.00	.00	.00	.00
RP 5	15.37	.00	.72	1.18	1.60	1.20	1.41	.33	.00	.00	.00	.00	.00
RP2	21.05	.79	2.18	2.74	3.55	3.16	3.10	1.49	.51	.07	.00	.00	.00
Wet Years													
RP 5	27.59	2.13	4.35	5.05	6.17	5.79	5.37	3.26	1.59	.50	.07	.10	.58
RP 10	31.37	3.05	5.80	6.59	7.82	7.45	6.80	4.46	2.38	.88	.20	.25	1.17
RP 20	34.68	3.94	7.17	8.05	9.35	8.99	8.12	5.60	3.15	1.27	.36	.43	1.81
RP 25	35.68	4.22	7.60	8.50	9.82	9.46	8.53	5.97	3.40	1.41	.41	.49	2.03
RP 40	37.70	4.81	8.48	9.45	10.79	10.43	9.37	6.71	3.92	1.69	.54	.63	2.50
RP 50	38.62	5.08	8.90	9.89	11.24	10.88	9.76	7.07	4.16	1.82	.60	.69	2.73
RP 100	41.38	5.92	10.17	11.25	12.60	12.26	10.94	8.14	4.92	2.24	.79	.91	3.46
RP 200	43.98	6.76	11.42	12.58	13.93	13.59	12.09	9.20	5.68	2.67	1.00	1.13	4.20
RP 1000	49.64	8.66	14.24	15.58	16.89	16.56	14.66	11.61	7.42	3.69	1.50	1.67	5.99

APPENDIX E

AWA Water Supply Data 2008

TABLE 6
WATER SUPPLY MONITORING
Amador Water Agency
Raw Water Sample 2008

Alkalinity, Bicarbonate (mg/L)	18
Alkalinity, Carbonate (mg/L)	<5
Alkalinity, Hydroxide (mg/L)	<5
Alkalinity, Total (mg/L)	18
Calcium (mg/L)	4.8
Chloride (mg/L)	6.1
Color (Units)	14
Corrosivity (Langlier Index)	-1.93
Cation/Anion Balance (meq/meq)	0.463
Fluoride (mg/L)	<0.10
MBAS (mg/L)	<0.10
Hardness (mg/L)	18
Magnesium (mg/L)	<2.0
Nitrogen, Total Nitrite-N (mg/L)	<0.05
Nitrogen, Total Nitrate-N (mg/L)	<0.05
Odor-Threshold (Units)	<1
pH (SU)	7.7
Sodium (mg/L)	4.7
Specific Conductance (μmhos/cm)	65.2
Sulfate (mg/L)	1.6
TDS (mg/L)	68
Turbidity (NTU)	1.6
Aluminum (mg/L)	0.057
Arsenic (mg/L)	<0.002
Barium (mg/L)	<0.05
Cadmium (mg/L)	<0.001
Total Chromium (mg/L)	<0.002
Hexavalent Chromium (mg/L)	<0.002
Copper (mg/L)	<0.003
Iron (mg/L)	0.210
Lead (mg/L)	<0.003
Manganese (mg/L)	0.017
Mercury (mg/L)	<0.001
Nickel (mg/L)	<0.005
Selenium (mg/L)	<0.001
Silver (mg/L)	<0.002
Thallium (mg/L)	<0.001
Zinc (mg/L)	<0.005

APPENDIX F

*Ione WWTP Master Plan EIR
by RMT/MHA dated December 2009 -
Hydrology Section*

3.1 Hydrology and Water Quality

3.1.1 ENVIRONMENTAL SETTING

Climate

The project area is located in the Mediterranean-type climate zone typical of central California. This zone is characterized by cool, wet winters and warm, dry summers, with over 90 percent of all rain falling from the months of October to April.

The nearest source of long-term meteorological data is available from the Camp Pardee weather station (East Bay Municipal Utility District station #CPD) rain gauge located approximately 10 miles southeast of the project site in the Ione Valley. The Camp Pardee station is at an elevation of 658 feet above mean sea level (msl), similar to the average elevation in the City of Ione (260 feet msl), and experiences a similar pattern of rainfall events and amounts. For the period of record from 1927 to 2008 (81 complete years), mean water year rainfall[1] at the Camp Pardee station was about 21 inches.

Periods of abundant rainfall and periods of prolonged droughts are frequent in the historical record. Prolonged dry conditions in the late 1980s and early 1990s with 6 consecutive years of below-average rainfall were followed by a decade of generally above-average rainfall conditions, with very wet years in water years 1993, 1995, 1998, and 2006. Rainfall totals for water year 2007 and 2008 rainfall were below average, and this trend has continued in water year 2009 to date.

The calculated 10-year recurrence interval, 24-hour storm event is estimated at 3.25 inches of rainfall. The calculated 100-year recurrence interval, 24-hour storm event is estimated at 4.75 inches of rainfall (NOAA 1973).

Average evapotranspiration[2] for the City of Ione area is estimated at about 57 inches annually, of which only about 20 percent (11.16 inches) occurs during the non-irrigation season of November through March (Appendix D). Evaporation and evapotranspiration rates then rise in response to warmer weather and soil moisture storage is typically depleted by early May. Growth of non-riparian native vegetation slows or stops completely by early May, and landscape managers commence irrigation at about this time and generally maintain such irrigation into October.

Topography

The project area is located in the Ione Valley, nestled in the foothills of the western slope of the Sierra Nevada. The Ione Valley is bisected by Sutter Creek, which flows westwards towards the Cosumnes River. Elevations rise from about 250 feet above mean sea level (amsl) west of the City of Ione, situated on the relatively flat valley floor, to about 400 amsl at the Highway 88 crest in the hills southwest of the City.

Drainage and Hydrography

The project area is located in the vicinity of Sutter Creek and Mule Creek (Figure 3.1-1). These streams originate in the Sierra Foothills. Sutter Creek and Mule Creek originate in the lower foothills of the Sierra Nevada, where rainfall averages roughly 30 to 50 inches per year. Runoff is

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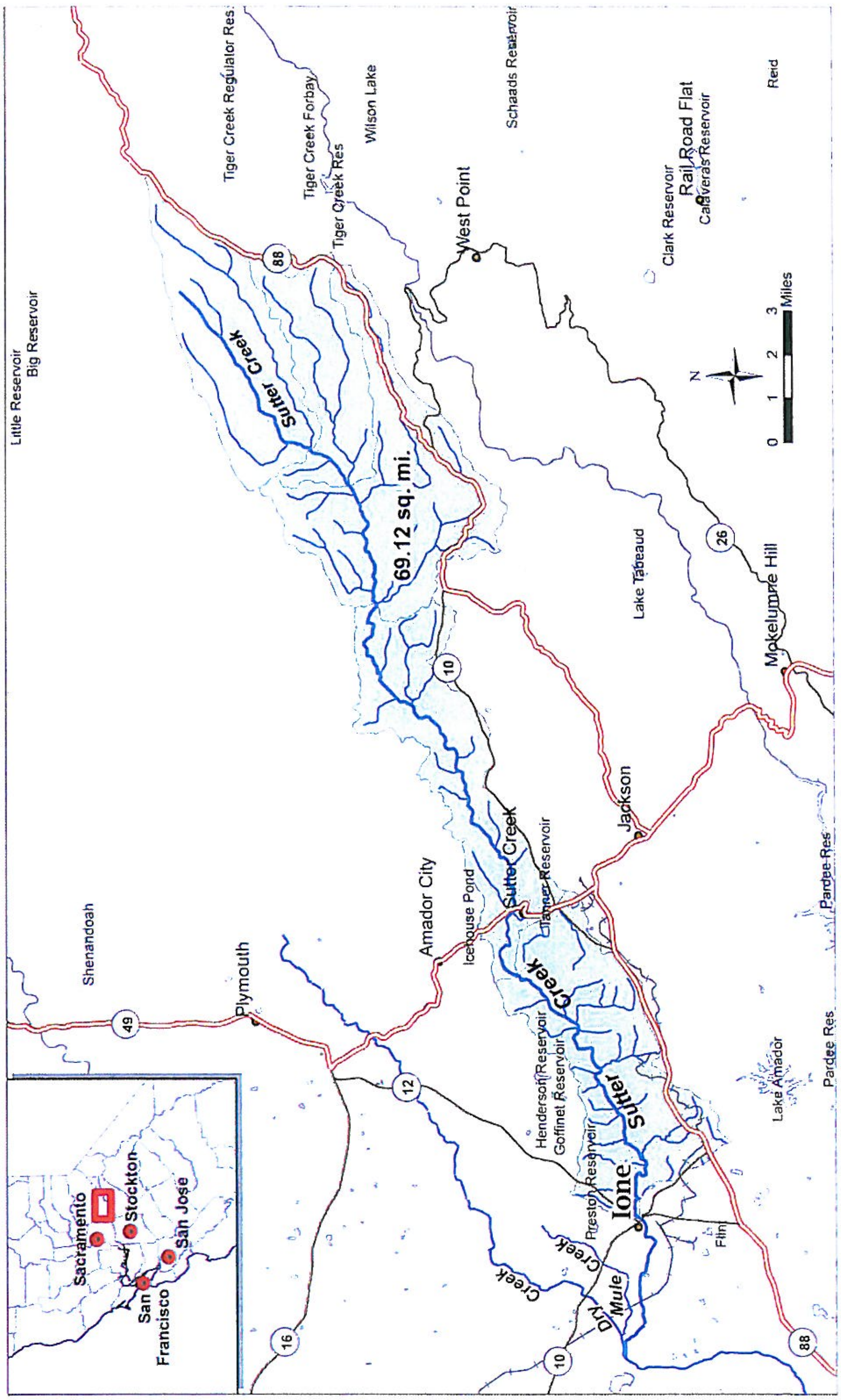
[1] Most hydrologic and geomorphic monitoring occurs for a period defined as a water year, which begins on October 1 and ends on September 30 of the named year. For example, water year 2009 (WY2009) began on Oct. 1, 2008 and will conclude on September 30, 2009.

[2] Evapotranspiration is the combined process of transferring moisture from the earth to the atmosphere by transpiration from plants and evaporation of water.

Figure 3.1-1: Regional Watershed Map



SOURCE: USGS, California Spatial Information Library, Balance Hydrologics Inc. 2007

Balance Hydrologics, Inc.

also a source of water for these creeks. The creeks discharge to Dry Creek within about 0.5 mile of each other just west of Ione at an elevation of approximately 250 feet amsl.

The land surrounding both watersheds is mostly rural, with large contiguous acreages of grazing land and chaparral-covered slopes, and sparse development. Several institutions are located in the lower watershed, most notably the Mule Creek State Prison and the Preston School. Adjoining the Mule Creek State Prison (MCSP) is a sizeable acreage of pasture irrigated with secondary effluent produced by the prison's own wastewater treatment plant.

Sutter Creek

Watershed

The headwaters of Sutter Creek are at an elevation of approximately 3,500 feet amsl, and snowmelt can play a significant role in the pattern of runoff from individual events or in seasonal hydrology. Mule Creek originates lower in the foothills, at an altitude of approximately 1,200 feet amsl, and is generally unaffected by snowmelt. Both creeks are part of the larger Dry Creek watershed, which also drains most of the Plymouth area. Sutter Creek has a watershed area of about 69 square miles at the City of Ione.

Streamflows

Mean monthly flows, as shown in Figure 3.1-2, illustrate the annual flow pattern typical of Sutter Creek. The historic data also show the effect of annual rainfall patterns on flows during non-storm periods (or "baseflows"). During the wettest years, baseflows can be 1.2 to 4 times greater than during normal years, which in turn are 1.7 to 6 times greater than during drier years. Flows in Sutter Creek at Ione drop to barely discernible levels during dry years, such as 2007 and 2008. The channel is typically transformed into a series of discontinuous pools by late summer. Some of the pools are sustained until rains commence again.

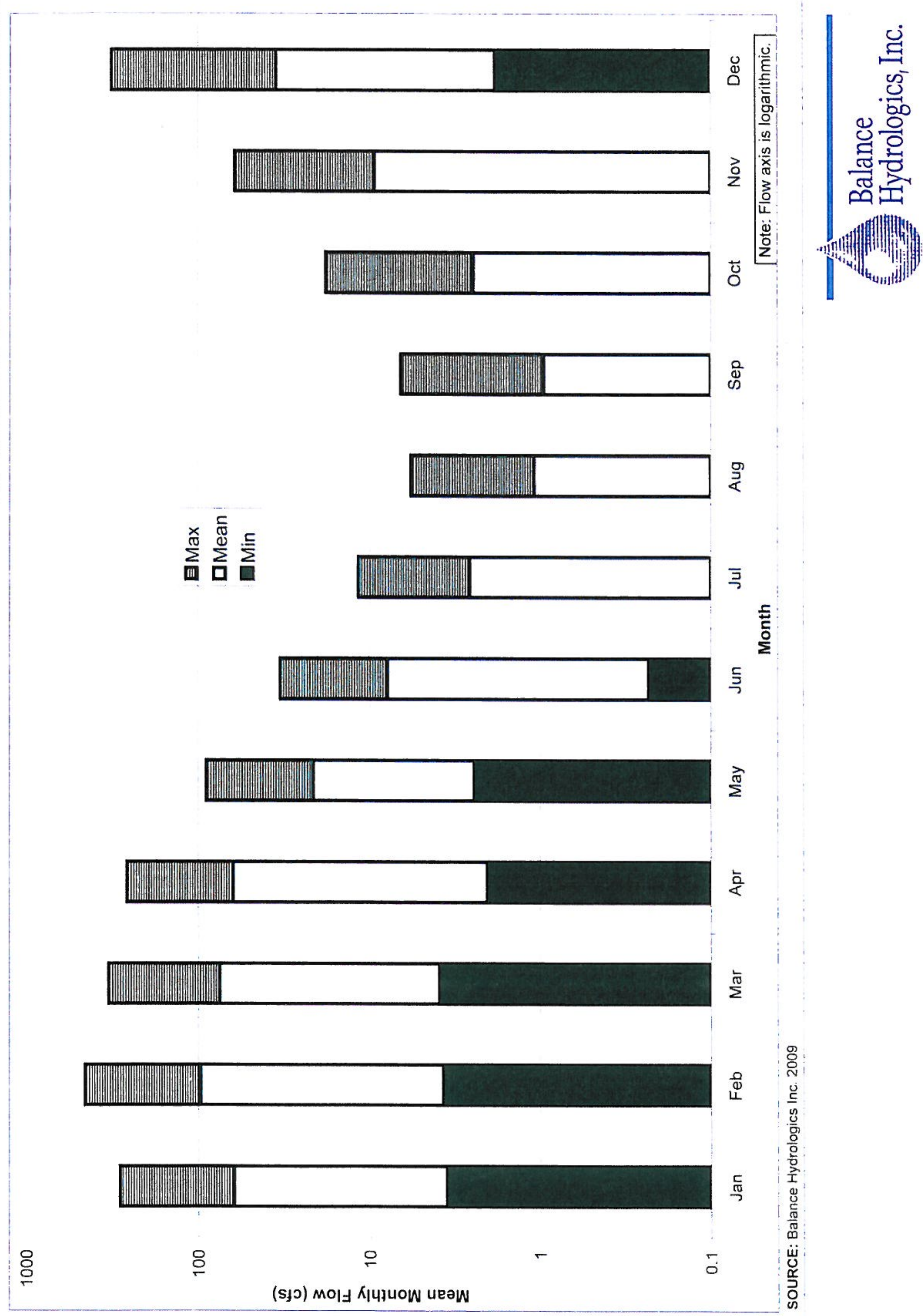
During the spring and summer of 2007, non-storm stream flows were periodically measured at various locations along Sutter Creek spanning from the City of Ione to just downstream of the COWRP. Rainfall during the preceding months was well below average. The record from the Camp Pardee rain gauge shows that approximately 14.7 inches of rain fell in water year 2007, which is roughly 70% of average precipitation. Baseflow in Sutter Creek at the City WWTP during the spring of 2007 was approximately 10 cubic feet per second (cfs). Streamflows receded steadily through the following months, dropping to only about 0.02 cfs (less than 10 gallons per minute) by October 2, 2007.

During periods of low flow, a high percentage of the water in the channel system may be flowing subsurface through the sand, gravel, and cobble bed materials. Stream flow measurements along the reach of the Creek bordering the City WWTP show that flows enter and re-emerge from the subsurface bed materials. For example, on July 6, 2007, streamflow in Sutter Creek was 0.24 cfs at the utility bridge, a footbridge that crosses the Creek at the northeast corner of the City WWTP, and 0.35 cfs at the Five Mile Drive Bridge less than 1 mile downstream, where harder sediments force underground flows through the gravels to the surface.

Mule Creek

Mule Creek has a watershed area of approximately 5 square miles where it is crossed by Five Mile Drive. Mule Creek is part of the larger Dry Creek watershed, which drains most of the Plymouth area. Mule Creek, to a lesser extent than Sutter Creek, flows between natural levees formed over thousands of years by flood overflows from the creeks.

Figure 3.1-2: Annual Flow Pattern Typical of Sutter Creek



Floodplains and Flooding

Most high flows through the Ione Valley and along Sutter Creek and Mule Creek are confined within the banks of the incised creeks. Floodwaters occasionally spill over the banks and onto the valley floor. The origin of the flooding is generally in downtown Ione where the channel of Sutter Creek is not as incised as it is as near the two sewage treatment facilities. Flood flows are directed by the 'natural levee' topography toward the southern edge of the Ione Valley, where they generally flow along the railroad tracks across Old Stockton Road, returning to the main Sutter Creek channel downstream of the COWRP. Spills at points farther downstream, where the stream is more incised, are possible if the flow is obstructed, such as by a collapsed bridge or a wood or debris jam. Spillover downstream could occur immediately downstream of the utility crossing and over the north bank of Sutter Creek, where flows would then route to the lowermost portion of Mule Creek.

The Ione WWTP and the COWRP are located on the Sutter Creek floodplain. The Castle Oaks Golf Course is mainly located on the Mule Creek floodplain, while its southern end is located on the convergent floodplain (or 'interfluve') between the two streams. Figure 3.1-3 is an aerial photograph showing the location of the two facilities. The two wastewater treatment plants are positioned on the slightly-elevated natural levees along Sutter Creek and are not prone to flooding during events up to and including the 100-year flood event.

As shown on Figure 3.1-4 and, based on the Flood Insurance Rate Map for the project area, the City WWTP is not located within a 100-year flood hazard area (FEMA 2000). The COWRP Is subject to flooding on portions of the site bordering Sutter Creek, but most of the property lies above the 100-year inundation level. The Castle Oaks Golf Course is situated above the 100-year flood hazard area for Sutter Creek but portions of the playing area lie within the 100-year floodplain of Mule Creek (FEMA 2000).

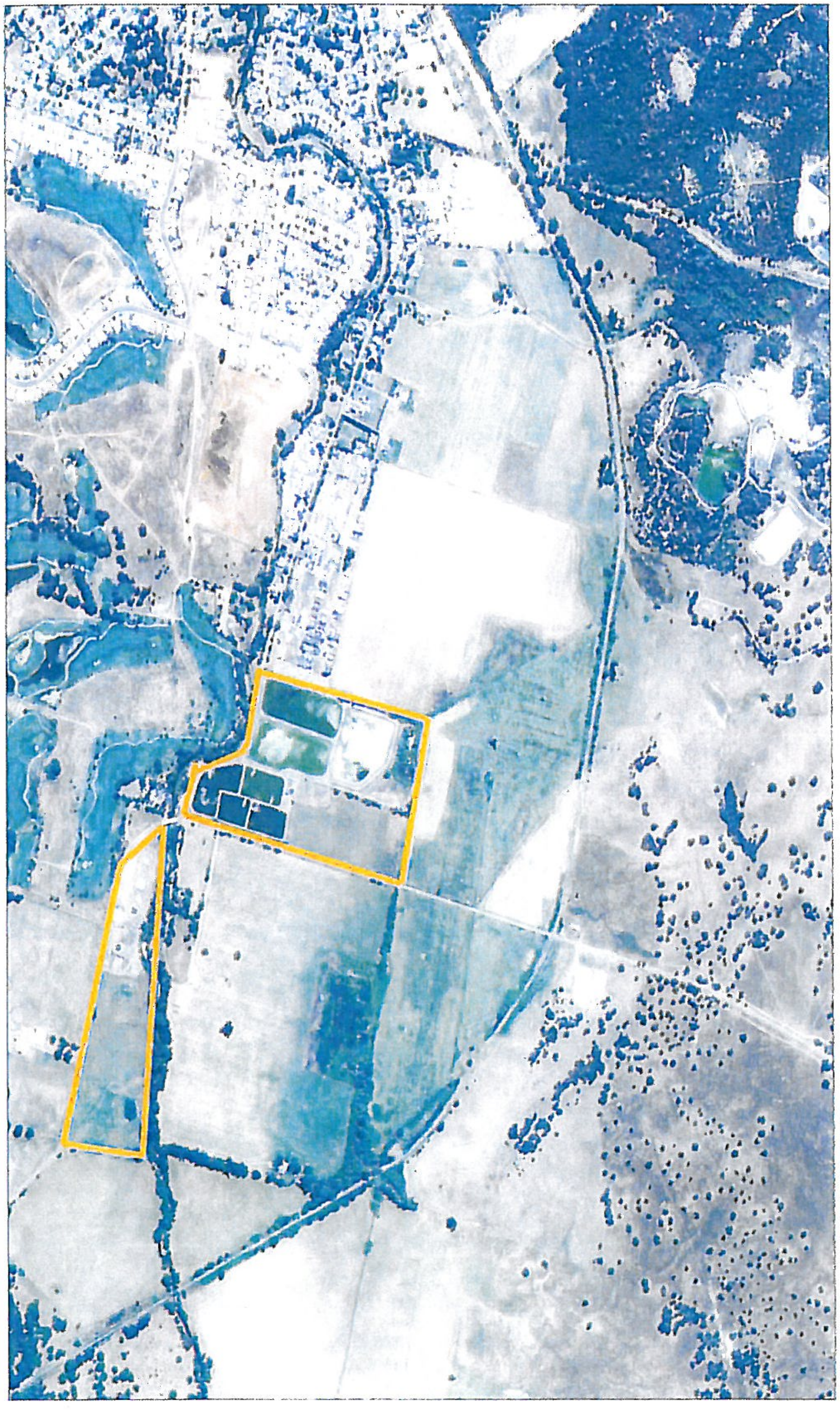
Groundwater

Aerial photographs show a persistently wet area extending south from the southeast corner of the WWTP southward and southwestward to the base of the hills that define the southern border of the Ione Valley. Because this wet area persists through sequences of wet and dry years, it is believed that this wet area is formed by groundwater moving southwestward through the southern part of the Ione Valley. A contributing factor to the elevated groundwater table in this area may be subsurface drainage from beneath the southern hill slopes. Field work was conducted as part of this EIR to help identify sources of water to this wet area.

Based on the existing information, the aquifers in the vicinity of the project area are the alluvial sediments west of Ione and above the Ione formation, and between the base of the slopes forming the northern and southern valley walls. It is helpful to consider the alluvial aquifers north and south of the creek as different aquifers of similar geology affected by the various uses of land and water that occur north and south of the creek, because Sutter Creek has incised through all or nearly all of the thickness of the alluvial deposits. The northern and southern alluvial aquifers receive inflow from upstream, with principal recharge occurring near the town of Ione and near Mule Creek State Prison, respectively. In both cases, recharge may also occur to varying but secondary degrees from the terraces above the alluvial valley. Assessment of potential contributions from Unimin Mine operations to the alluvial aquifer in the valley south of the City WWTP, if there are contributions, was not possible because of the limited amount of information available on groundwater depths and water quality at the Mine.

Some exchange between the alluvial aquifer and the groundwater of the underlying Ione formation occurs in small areas, probably at very low rates given that permeabilities through the Ione clays

Figure 3.1-3: Aerial Photograph with Castle Oaks WWTP and Castle Oaks Golf Course

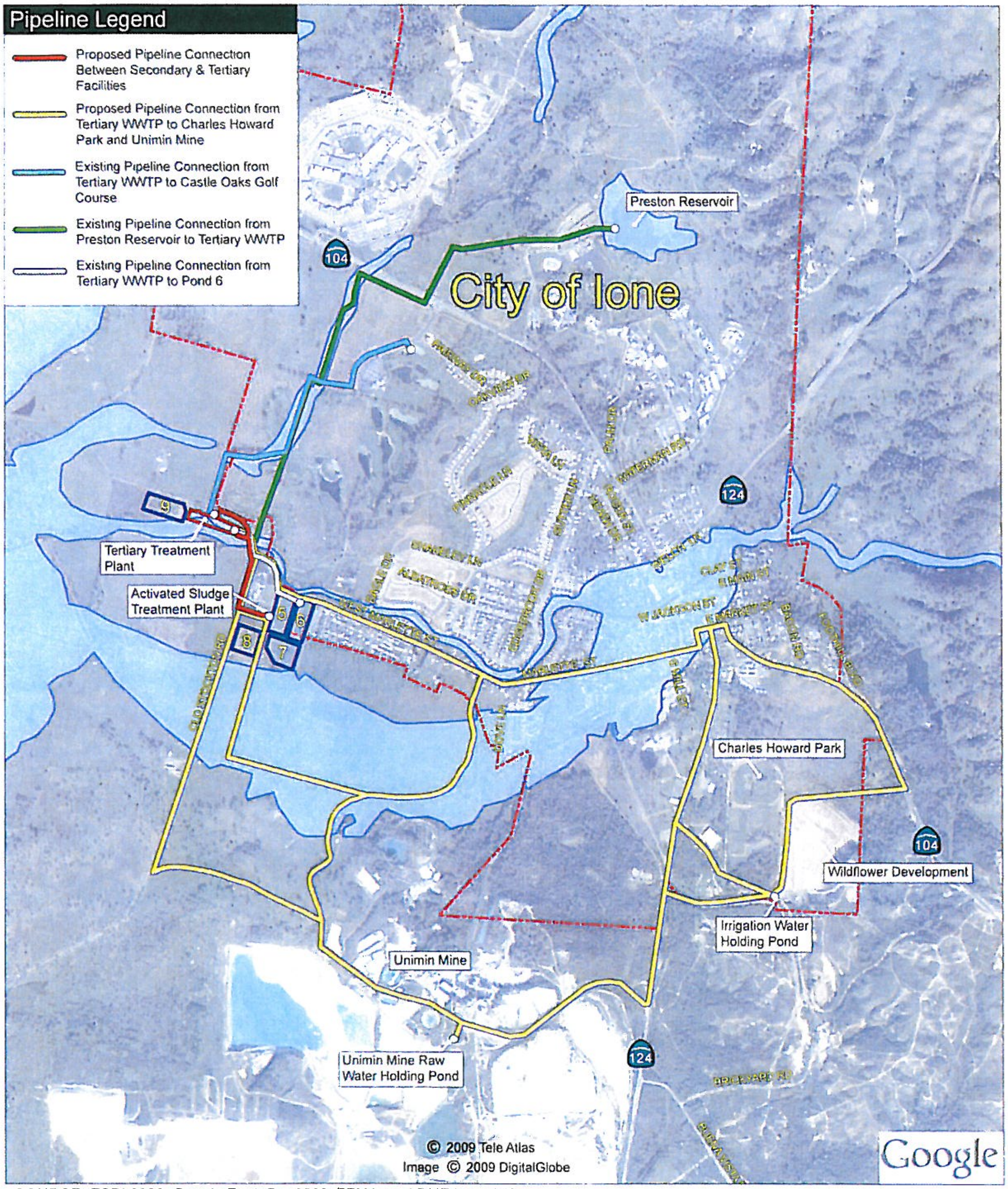


Balance Hydrologics, Inc.

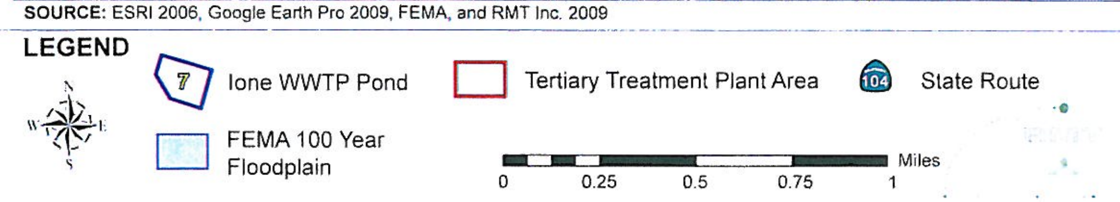
SOURCE: Balance Hydrologics Inc. 2009

Aerial photo is dated May, 2005. The Ione and Castle Oaks WWTPs are shown. Groundwater within the alluvium flows to WSW where it can subirrigate the extensive swath of live hay (shown in green) in contrast to the fields that have already been mowed and gone dormant for the season.

Figure 3.1-4: Proposed and Future Potential Facilities and 100 Year Floodplain



SOURCE: ESRI 2006, Google Earth Pro 2009, FEMA, and RMT Inc. 2009



are only about 10^{-6} cm/sec (Shalter pers. comm. 2008). The Ione formation effectively forms a low-permeability floor to the aquifer systems affected by the proposed project.

Much of what is known about the two alluvial aquifer systems is based on a number of piezometers and shallow monitoring wells, which are described in detail in Appendix D. The location of these wells and piezometers is shown in Figure 3.1-5.

Groundwater Aquifers and Recharge

Groundwater occurs within the alluvial aquifers, as well as the Ione formation and bedrock units known locally as the Salt Springs Slate and the Copper Ridge Volcanics. These and other alluvial units are described below.

Quaternary Alluvium of the Ione Valley

The alluvial units south and north of Sutter Creek and along Mule Creek are part of the Riverbank and Modesto formations of late-Pleistocene age (Loyd 1983; Lessing 1990). They are sandy and silty units deposited by Sutter Creek and Mule Creek during storms and floods of the past 100,000 years.

Ground water occurs north and south of Sutter Creek in this alluvial aquifer that is typically 20 to 40 feet thick, with a lower boundary on the characteristic clays of the Ione formation. The alluvial aquifer generally coarsens with depth; it is composed of sandy or clayey silt to depths of 9 to 14 feet overlying a coarsening-downward sequence of silty sands, gravelly sands, and sandy gravels (Wallace Kuhl Associates 2003).

Double-ring infiltrometer tests in the upper alluvium yielded hydraulic conductivity (permeability) values of about 0.6 inches per hour (in/hr). Most rain can infiltrate into the local soils, where not compacted or covered by impervious surfaces or by water, because most winter rainfall occurs at much lower intensity than 0.6 in/hr.

The Ione WWTP and the COWRP are situated on natural levees that have developed over many thousands of years. The floor of the Ione Valley drains away from the Sutter Creek channel. The natural levees are coarsest near the creeks, becoming progressively finer near the valley walls, because the coarser material settles out of floodwaters long before they reach the Valley edge. The recharge rates in undisturbed areas are highest near the streams because of the coarseness of the soil.

Soil permeabilities are generally highest near Sutter Creek, decreasing with increased distance from the channel, as the fine sandy loam soils transition through silt loams to clay loams at the edges of the valley. Mule Creek also has natural levees, although they are much more muted than those of Sutter Creek. The finest soils are found near the edges of both valleys, and the direction of groundwater flow is toward the valley margins.

The alluvial aquifers north and south of Sutter Creek are separated from each other by the incised Sutter Creek stream channel. The two aquifers have similar geometries, but are recharged and flow independently; therefore, they are considered as separate units for purposes of analysis in this chapter. The Mule Creek alluvial system seems to be integrated with the northern alluvial aquifer of Sutter Creek; however, the extent to which the aquifers on either side of Mule Creek behave independently from each other and/or the Sutter Creek system is unknown.
Groundwater levels in the alluvial aquifers fluctuate about 4 to 6 feet seasonally, with the largest responses observed during the wettest years. Water levels at the end of the summer months are commonly about 2 to 3 feet lower during droughts than following years of above-normal rainfall (Condor 2009). Water appears to be available within the root zone of pasture grass and other

issues regarding elevated concentrations of dissolved iron are aesthetic (taste, odor, and color), not health-related. The Title 22 secondary MCL for iron is 0.3 mg/L. Though the iron levels found in some of the monitoring wells exceeded this Title 22 standard, iron does not represent a health-related concern, and so the existing WWTP's impact on iron levels is not considered significant.

COWRP Facility (Tertiary Treatment Plant)

Water quality data from the three remaining piezometers (P-1, P-2, and P-4) just west of the COWRP plant are sparse. TDS levels, calculated from specific conductance measurements in January and March 2009, ranged from 440 mg/L at P-4 to 606 mg/L at P-2. These levels are relatively high compared to those in golf course monitoring wells CO MW-1 and CO MW-3, but much lower than CO MW-2, suggesting that groundwater in this area is also influenced by waters emanating from the Ione formation.

Mule Creek State Prison

The ten monitoring wells at the Mule Creek State Prison were first sampled in March 2007 as part of the facility's wastewater plant monitoring well program. Analysis of water quality constituents included general minerals (e.g., major cations, anions, TDS), nutrients, trihalomethanes, and coliform bacteria. Measurements from these ten wells are listed in Table 3.1-2.

Average TDS levels were highest (690 mg/L) in wells completed in the older bedrock, lower (389 mg/L) in wells completed in the Ione formation, and lowest (289 mg/L) in the two downgradient wells completed in the more recent alluvium. The wells were not sampled for ammonia. Iron was not detected in either the background wells or the downgradient wells. Due to the limited dataset, no conclusions were drawn regarding the impact of Preston Reservoir or the Mule Creek State Prison's spray fields on downgradient groundwater.

South of Sutter Creek

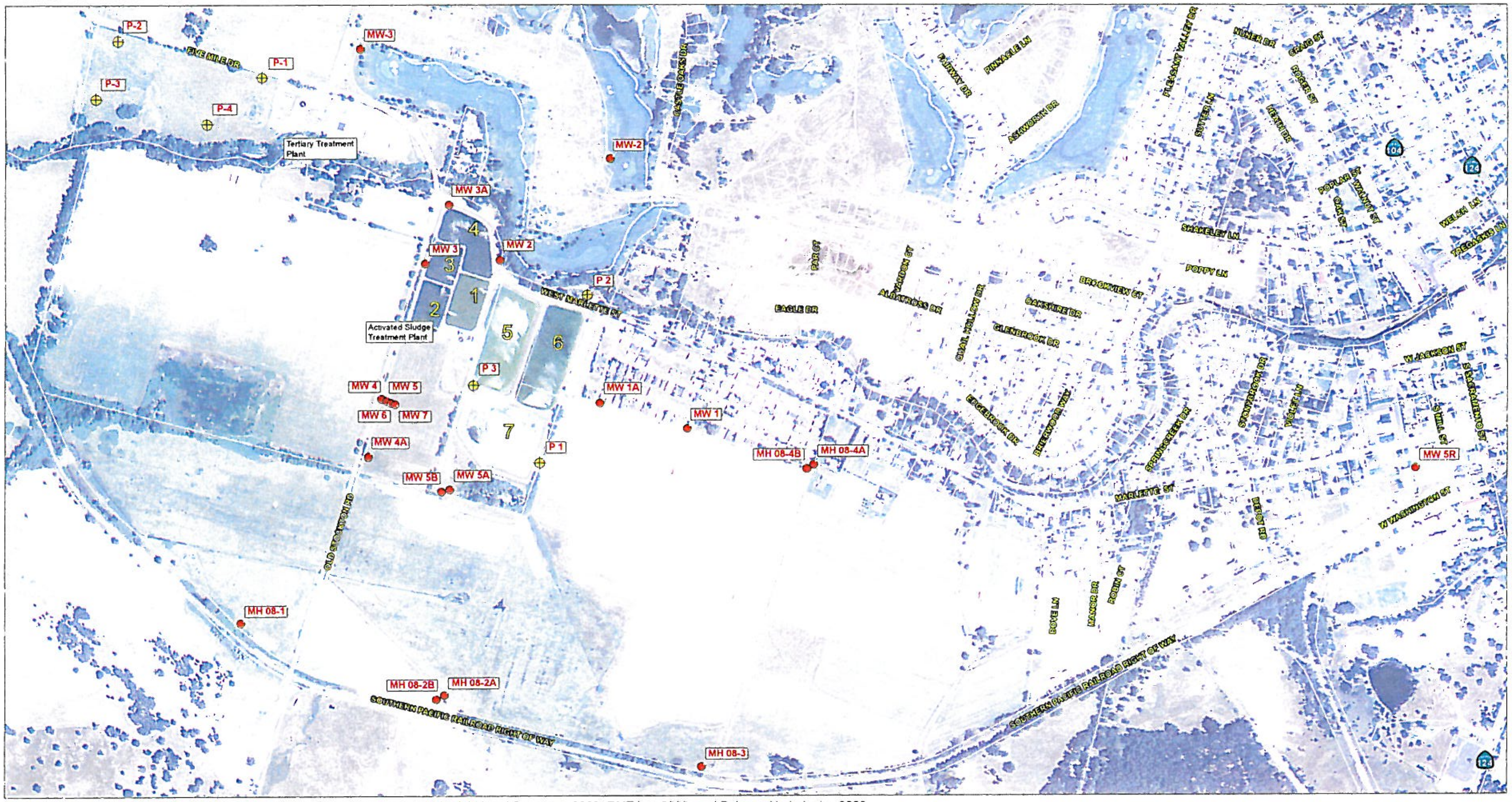
Locations of the monitoring points described below, which include wells and piezometers installed at the City of Ione secondary WWTP between 2002 and 2007, off-site wells installed in January 2009, and sites along Sutter Creek in the area of the secondary WWTP, are shown in Figure 3.1-6.

TDS concentrations are useful in identifying water sources and indicating whether or not a particular well is being affected by WWTP operations. On March 11, 2009, samples were collected from most of the wells south of Sutter Creek, as well as from three locations along the creek, and submitted to state-registered laboratories for TDS and general minerals analyses (Table 3.1-3). With few exceptions, the results were representative of the full period of record, as detailed in annual monitoring reports, which extends to July 2002 for MW-1, MW-2, MW-3, and MW-4.

TDS concentrations were lowest in Sutter Creek and highest in the off-site wells south of the WWTP near the railroad tracks, which are more strongly influenced by the Ione formation and therefore would be expected to have higher TDS concentrations. Concentrations in upgradient wells were slightly lower than in almost all of the wells within the zone of influence of the effluent disposal ponds. Because the treated effluent TDS concentration averages approximately 220 mg/L[4], these concentrations strongly support the annual monitoring reports' conclusions that the percolation ponds are not significantly affecting TDS concentrations in the local aquifer, and that additional sources of TDS are present in the valley. The Ione formation is the most likely reason for elevated TDS levels in the area; however, off-site sources may also be contributing water with elevated TDS levels.

[4] Data from the City of Ione: Average Effluent table/spreadsheet. The equivalent specific conductance was 386 µS.

Figure 3.1-5: Well and Piezometer Locations



SOURCE: U.S. Geological Survey, EROS Data Center, Sioux Falls, SD 2009, Nordahl Land Surveying 2009, RMT Inc. 2009, and Balance Hydrologics 2009

LEGEND

Monitoring Well
Piezometer
Ione WWTP Pond
State Route

0 500 1,000 1,500 2,000 Feet

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crops along the southwestern side of the Ione Valley in nearly all years, based on the aerial photography available.

Groundwater beneath both facilities is recharged directly from rainfall and indirectly from the creeks at locations upstream. Direct recharge through the soils averages about 4 to 5 inches per year, with a 22-inch annual rainfall. The southern alluvial aquifer, with an extent of about 1,000 acres, may recharge about 330 to 415 acre feet from rainfall, on average; the northern alluvial aquifer may receive recharge at the same annual rate from about half of the area.

Both aquifers are also recharged from the two creeks, typically at locations far upstream of the WWTP and COWRP. The southern alluvial aquifer is likely recharged in the area of downtown Ione, and at locations downstream. Groundwater inflow from the terraces to the south of the Ione Valley also recharges the southern alluvial aquifer. The northern aquifer is likely recharged from Sutter Creek near the pipeline crossing, from inflow from the terrace areas to the east, and from Mule Creek and its tributaries, in addition to percolation from the Castle Oaks golf course and facilities at Mule Creek State Prison. At present, there are no estimates of the rates of recharge from the streams.

The City of Ione's existing wastewater treatment and disposal facilities, a major source of local groundwater recharge, are described in detail in Appendix C, Existing Facilities and Projected Growth. The City of Ione WWTP treats raw effluent that is eventually discharged to Pond 4, the first in a series of four unlined ponds (Ponds 4-7) where secondary treated wastewater percolates to groundwater. Total recharge through the roughly 16.8 acres of disposal pond bottom area is calculated at about 289.6 million gallons per year (Appendix C), or about 1.7 inches of effluent per day. Sources and rates of recharge to the southern aquifer from sources upgradient from the City WWTP cannot be estimated at present; however, these contributions can eventually be estimated using data from the off-site monitoring wells installed in January 2009.

At the COWRP, secondary treated wastewater receives tertiary treatment during the drier months of the year (typically April to November), and supplies tertiary treated wastewater for the irrigation of the Castle Oaks Golf Course. In wet periods, the ARSA secondary treated wastewater is directed to the secondary WWTP and disposed of in Ponds 5-7. Direct recharge through the golf course at times when no irrigation water is being applied is between 4 and 5 inches annually. Treated effluent applications average approximately 38 inches per acre annually, as compared to evapotranspiration rates of almost 42 inches during the 6-month long irrigation period. This equivalence between effluent applications and losses indicates that potential recharge below the turf root zone is limited.

Valley Springs Formation

The Valley Springs formation outcrops locally in the southern portion of the Unimin Mine area, about 1 mile south of the project area, and on Duttscher Hill, about two miles to the west (refer to Section 3.3, Geology, Soils, and Seismicity). While highly variable in texture, recharge through the Valley Springs formation may be greater than through the Ione formation and groundwater flow may be less restricted, as this unit is regarded as less consolidated and more transmissive than the Ione formation. It is possible that some units of the Valley Springs formation occur beneath the alluvial cover in the lowermost Sutter Creek or immediately adjacent areas of the Dry Creek Valley, where groundwater from the Sutter Creek alluvium (which includes recharge originating as percolated effluent from the City of Ione WWTP) may eventually mix with regional groundwater.

Ione Formation

The Ione formation occurs north and south of the City, and underlies most or all of the Sutter Creek and Mule Creek valleys. It is a highly-variable unit containing correlatable beds of clay and lignite (a type of coal), and massive sands, with a total thickness of 40 to 400 feet in areas west of

Ione (Creely and Force 2006; Lessing 1991). The clays impart a low to very low permeability of about 10^{-6} cm/sec (Shalter pers. comm. 2008). Although the lower Ione formation is considered to be predominantly non-marine, it does include marine deposits, consistent with the finding that groundwater in the Ione formation tends to be somewhat saltier than the alluvium above it (Creely and Force 2000). Water moves generally west-southwestward in the Ione formation, in the direction of its geologic dip (Shalter pers. comm. 2008). Near the southern edge of Sutter Creek valley, water may move from the uplands to the south toward the valley floor. The quality of water in the Ione formation is generally good, with mixed ionic composition in certain units, with sodium and chloride predominating in others. Specific conductance (which is used as a proxy for TDS) values vary for about 180 usiemens (uS) to upwards of 1,000 uS (Lessing 1990).

Salt Springs Slates Formation

Water occurs in fractures and weathered zones of the Salt Springs Slates formation and related foliated metamorphic bedrock that predominates in the Ione area. These rocks are exposed in the hills east of Ione, with a small pocket immediately north of Mule Creek State Prison, but are as deep as 400+ feet beneath the Ione Valley. They are from the Jurassic age, and immediately underlie the Ione formation beneath most of the study area. Groundwater yields are commonly low and are most suited for small domestic wells that can operate sufficiently on these lower flows. Water quality is variable, with specific conductance (calculated from reported TDS values) varying from about 570 to 2,700 uS.

Gopher Ridge Metavolcanics

These metamorphic rocks, which originated as seafloor volcanics from the Jurassic age, are another component of the crystalline bedrock underlying the Ione area. They are exposed along the edges of Preston Reservoir within Ione, and form Newman Hill, the bedrock knob at the west end of the Ione Valley. Little is known about the movement of groundwater within this unit, but it is thought to behave similarly to the Salt Springs Slates formation.

Groundwater Levels and Movement

North of Sutter Creek

The primary source of data on groundwater conditions north of Sutter Creek are the three monitoring wells on the Castle Oaks Golf Course (see Figure 3.1-5), which are located upgradient and downgradient from turfed areas that are irrigated from approximately April to October with tertiary-treated effluent from the COWRP. Based on data from quarterly monitoring beginning in 2001, water levels in all three wells respond similarly to seasonal weather patterns. Groundwater levels tend to be lowest in late fall, prior to the start of the rainfall period, and highest in spring following the wettest months.

Limited water level data from the three intermittently-monitored piezometers in the field immediately west of the COWRP show that groundwater elevations rose from about 10 feet below the ground surface to within several feet of the ground surface in response to the accidental discharge of secondary wastewater in spring 2007, then receded to pre-storage levels within 20 days of discharge termination. Subsequent data show that groundwater levels follow the expected seasonal trend of lower levels in summer and fall and higher levels in winter and spring. The groundwater gradients are generally from east (P-1 and P-4) to west (P-2), parallel to Sutter Creek, consistent with the data from the golf course monitoring wells.

Of the 10 wells installed in March 2007 at the Mule Creek State Prison north of the golf course, as part of the facility's wastewater plant monitoring well program, five were completed in the Salt Springs Slate bedrock and two were completed in the Ione formation (Condor 2007).

South of Sutter Creek

The primary source of data on groundwater conditions south of Sutter Creek is the RWQCB-mandated monitoring program at the City of Ione secondary WWTP. Additional data on ambient groundwater levels and water quality in areas farther upgradient from the secondary WWTP was collected by Balance Hydrologics from a set of off-site wells installed in the valley to the east and south of the facility in January 2009 (see Figure 3.1-6 for these well and piezometer locations).

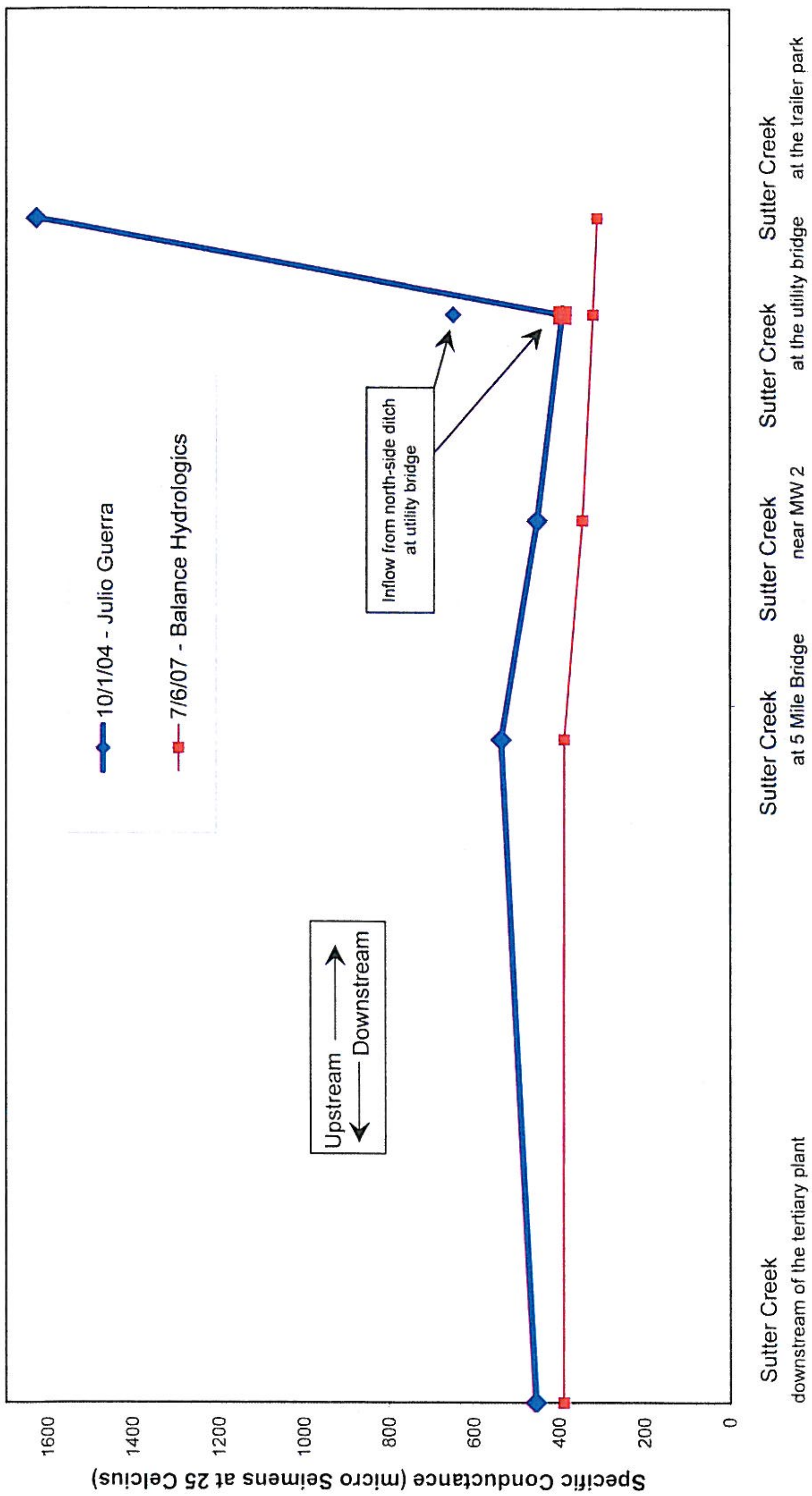
Groundwater elevations in all monitoring wells south of Sutter Creek respond to annual cycles of wetting and drying. Annual water level fluctuations are on the order of 3 to 5 feet, with higher levels observed in winter and spring months and lower levels in summer and fall. Water levels also respond to longer, multi-year climatic changes. Groundwater in the area of the secondary WWTP has attained levels as high as 264 feet amsl in winter 2005, while pond bottom elevations in the existing Ponds 1-7 range from 262 to 265 feet amsl. Thus, secondary treated wastewater from the treatment ponds enters the local perched aquifer without prior passage through a zone of unsaturated flow at least occasionally during wet periods.

Effluent disposal Ponds 4, 5 and 6 at the City WWTP were constructed in recent alluvium and a sizeable area of each pond lies within 100 feet of the south bank of Sutter Creek. Potential subsurface discharges of effluent from one or more of these ponds to Sutter Creek has been a concern since 2000, when RWQCB staff noted on the first of several inspection visits that there was seepage entering the creek from the stream bank adjacent to the facility. Discharge Prohibition A.1 in the RWQCB Waste Discharge Requirement (WDR) Order No. 95-125 for the City WWTP states that the discharge of wastes to surface waters or surface water drainage courses is prohibited. As detailed in the Cease and Desist Order (CDO) R5-2003-0108 issued in 2003, samples were subsequently collected from the percolation ponds, the seepage front, and Sutter Creek upstream and downstream from the City WWTP but results of laboratory analysis were inconclusive regarding a linkage between effluent disposal and stream flows. The CDO also noted that interpretation of the sample data was complicated by the influence of discharges from other sources along the stream reach bordering the City WWTP, such as a culvert on the north bank near the Castle Oaks Golf Course.

Prior to issuance of the CDO in July 2003, a geotechnical study (WKA, 2003) was undertaken to investigate concerns that erosion of the south bank of Sutter Creek where the stream channel bends sharply around the City WWTP site could potentially impact the wastewater treatment and disposal ponds. The study concluded that portions of the south bank through the stream reach bordering the City WWTP were unstable but that slope failures would not endanger pond operations. The same study also documented limited groundwater seepage into the creek under summer 2002 low-flow conditions. The seepage originated from portions of a relatively-thin (less than one-foot thick) lense of coarse, sandy-gravelly alluvial deposits at the base of the south bank below the City WWTP. Total inflows from this seepage front along the 1,400-foot reach of channel were estimated at 173 gallons per day (gpd), or about 0.12 gallons per minute (gpm). The study concluded that the seepage was probably limited to dry periods when water-level elevations in the channel are lowest due to little or no flow in Sutter Creek. During wetter periods or seasons, elevated water levels in Sutter Creek promote flow in the opposite direction, as water leaving the stream channel recharges the alluvium in the Ione Valley. Concrete riprap subsequently emplaced along portions of the south bank as protection against further erosion and slope failure also reportedly (J. Guerra, pers. comm.) reduced seepage inflows and/or obscured evidence of seepage.

For purposes of this EIR, Balance Hydrologics reviewed the 2003 geotechnical report and also investigated surface water-groundwater interactions along the reach of Sutter Creek bordering the City WWTP. The magnitude of groundwater inflows from the Ione Valley aquifer to the creek in the

Figure 3.1-6: Specific Conductance Transect for Sutter Creek



SOURCE: Balance Hydrologics Inc. 2009

Changes in specific conductance may signal an input of surface water or groundwater to the creek. These two transects were taken in October, prior to winter rainfall and July, during the spring recession flows. Other specific conductance transect measurements show similar patterns of increasing specific conductance between the utility bridge downstream of the tertiary plant.

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immediate area of the City WWTP was assessed using three different approaches: (1) surveying the south bank of Sutter Creek for signs of seepage, and conducting longitudinal measurements of (2) stream flow and (3) salinity (measured as specific conductance) from upstream of the City WWTP to well below the COWRP facility. All three lines of evidence suggest that the proportion of stream flow originating as percolating effluent from the City WWTP is at most a few percent, even under dry-year, late summer conditions when the gradient between the disposal ponds and the stream channel is greatest. The results of each of the three methods for assessing the groundwater interaction between the percolation ponds and Sutter Creek are described below:

1) Balance Hydrologics staff walked along the south side of the Sutter Creek stream channel several times between June and September of 2007, searching for evidence of persistent seepage into the creek. Despite the riprap and vegetation covering large portions of the lower south bank of Sutter Creek, seepage would have been visible as flowing water or damp spots on the soil and/or concrete riprap. Only one small area of seepage was located comprising several square feet of damp soil.
2) Stream flow in the reach of Sutter Creek bordering the plant would be expected to increase measurably if subsurface discharges from the area of the City WWTP exceeded the prior estimate of 0.12 gpm (WKA, 2003). On one occasion on July 6, 2007, Balance Hydrologics staff measured an increase of approximately 50 gpm over the stream reach from the utility bridge at the northeast corner of the City WWTP to below the Five Mile Drive Bridge less than one mile downstream; however, on other occasions (e.g., Oct. 2, 2007) the difference in flow between these two stations was only about 5 gpm or less, indicating a minor increase in Creek flow. Furthermore, other sources also contribute to flows along this reach, including a culvert on the north bank near the Castle Oaks Golf Course, discharges from a north-bank tributary, and groundwater entering from the aquifer north of Sutter Creek.
3) The specific conductance (an index for salinity) of treated effluent from the City WWTP averages about 386 µSiemens (µS), whereas a representative value for groundwater in the monitoring wells surrounding the plant is approximately 450 µS. Specific conductance in Sutter Creek varies depending upon the flow and the season. On March 11, 2009 (see Table 3.1-3), several weeks after seasonal rains had ceased, the specific conductance in Sutter Creek was 165 µS at the utility bridge and 160 µS just below Five Mile Drive Bridge, indicating that wet-season contributions from south bank seepage were minimal, as previously suggested (WKA, 2003). During the dry-season, baseflow measurements in October 2004 and July 2007 (see Figure 3.1-6) show only a slight increase in salinity through the same reach. Given the existence of the other sources of saline inflows along the north bank (see above), contributions to Sutter Creek from percolating effluent at the City WWTP appear to be minimal, as suggested by the earlier study (WKA, 2003).

Water levels in the off-site wells installed in January 2009 and monitored for a second time in March 2009 confirm the variability of hydrogeologic conditions in the portion of the Ione Valley to the east and south of the secondary WWTP. Water-level response to seasonal rainfall was greatest in the wells along the southern edge of the valley, except for the well on the Sparrowk Ranch property, where groundwater levels were already elevated to near the ground surface.

Prior secondary WWTP monitoring reports (e.g., ECO:LOGIC, 2006) concluded that groundwater flows generally from east to west, parallel to Sutter Creek with mounding (locally-elevated groundwater levels) occurring beneath percolation Ponds 5, 6, and 7, where the treated wastewater is recharged to the local aquifer. The mounding is demonstrated by the relatively flat groundwater elevation contours east of the percolation ponds and the steeper gradient to the west of these ponds, as shown in Figure 3.1-7. Based on an expanded set of monitoring data which includes measurements from the off-site wells installed in January 2009, the direction of groundwater flow through the valley south of Sutter Creek was found to be west-southwestward toward the southern edge of the valley.

Much of this groundwater eventually rejoins the Sutter Creek alluvial aquifer or enters the Dry Creek alluvial aquifer some distance downstream from the City WWTP. However, perhaps as much as 600 to 700 acre feet per year of groundwater (comprising both percolate from the Ione WWTP and contributions from areas upgradient of the plant) is consumed by evapotranspiration from an approximately 150-acre area of pasture to the south and west of the facility. Indications of a high groundwater table in this area, visible on Figure 3.1-4, also appear clearly on the earliest available aerial photograph from 1959, which effectively pre-dates the establishment of the Ione WWTP in 1958.

Water Quality

The quality and chemistry of surface water and groundwater are influenced by source waters (precipitation, surface water, groundwater, and irrigation), the geologic substrate of the aquifer, interactions between adjacent groundwater sources, and land management and land use activities. The natural background chemical signature of the groundwater is a reflection of the source water and how it becomes altered as it passes through the substrate. Total dissolved solids (TDS), a measure of all constituents dissolved in water, consists mainly of the major cations (calcium, magnesium, potassium and sodium) and anions (sulfate, bicarbonate, and chloride) and non-ionic silicate. TDS is a good general indicator of water quality and is particularly useful to distinguish between different water sources. Other constituents of interest when evaluating general water quality and the effects of WWTP operations include mobile forms of nutrients, such as ammonia- and nitrate-nitrogen, manganese, and iron. Water quality north and south of Sutter Creek is discussed separately below, while the Ione formation is discussed here, because the Ione formation can affect water quality monitoring results in all locations in the alluvial aquifer.

The Ione formation, which underlies much of the alluvial aquifer in the Ione Valley at depths of about 20 to 40 feet below the ground surface (bgs), has a strong influence on ambient groundwater quality. Waters from the Ione formation are typically (but not always) higher in total dissolved solids (TDS). A relatively high proportion of TDS in water from the Ione formation is composed of sodium and chloride. Magnesium (Mg^{2+}) and other cations are replaced with sodium the longer water is contained in the Ione formation. In some locations (e.g., Ferrari Ranch in Lincoln, California and near Roseville, California), chloride concentrations can be as high as 10,000 mg/L, as compared to the Title 22 California Drinking Water secondary Maximum Contaminant Level (MCL[3]) for TDS of 500 mg/L. Chloride concentrations may be very low at locations where the Ione formation has been flushed of salts, or where alluvial waters recharge the aquifer through unknown pathways. Some of the older bedrock units underlying the Ione formation, such as the Salt Springs Slate formation, may also generate waters high in chloride and other dissolved solids.

North of Sutter Creek

The discussion in this section is based on monitoring data from the three monitoring wells at the Castle Oaks Golf Course and the three remaining piezometers in the field west of the COWRP facility (as shown in Figure 3.1-7), as well as the monitoring wells recently installed at the Mule Creek State Prison, northeast of the Castle Oaks Golf Course.

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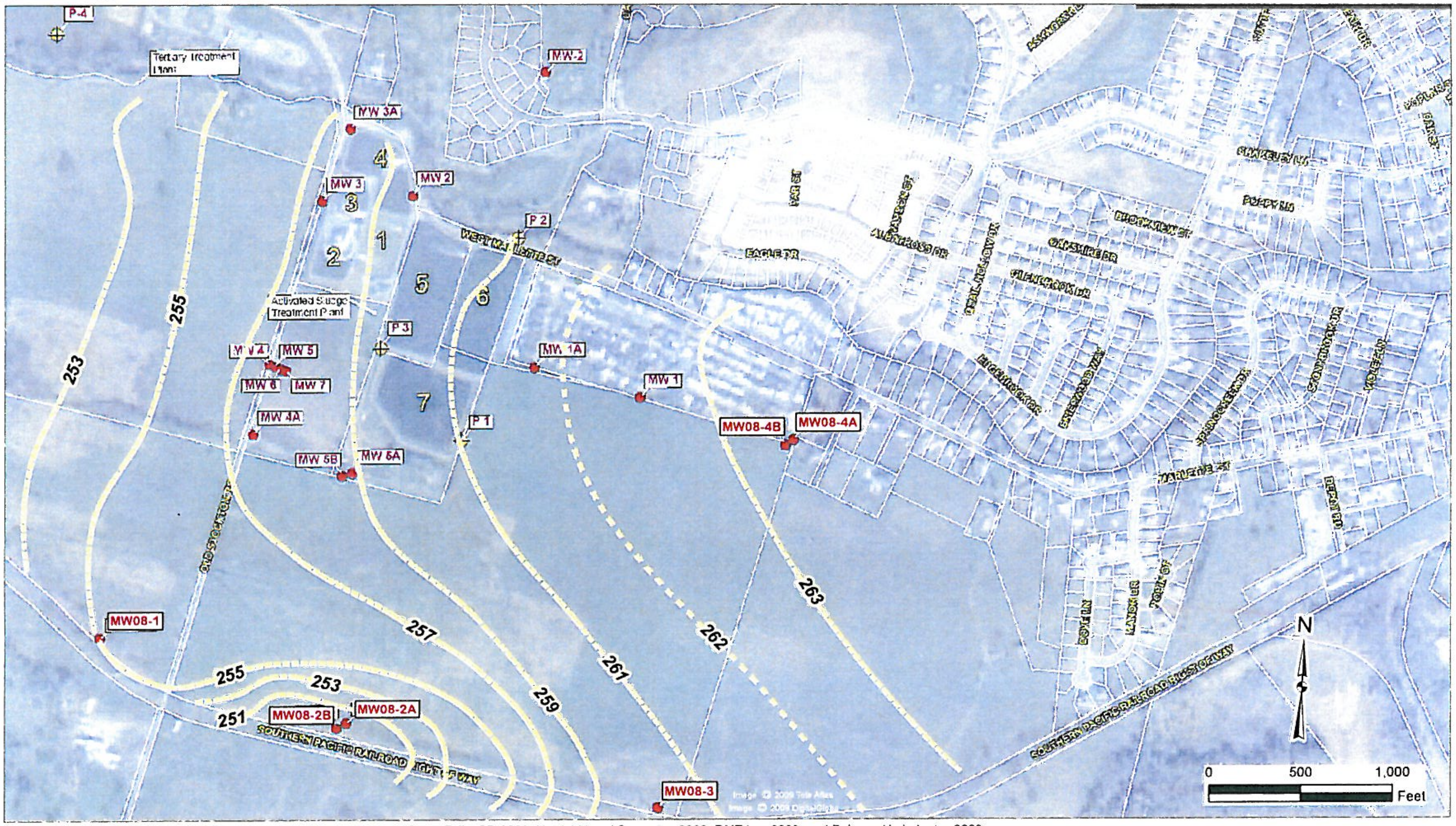
[3] Title 22 of the California Code of Regulations specifies water quality objectives for municipal supply (potable water). Title 22 regulations establish enforceable standards known as Maximum Contaminant Levels (MCLs) for constituents that present a risk to human health. Title 22 also establishes Secondary MCLs, which are guidelines for contaminants posing potential aesthetic concerns (taste, odor, color), but which do not present a risk to human health.

Figure 3.1-7: Inferred Groundwater Level Map



SOURCE: Google Earth Pro 2009, U.S. Geological Survey, EROS Data Center, Sioux Falls, SD 2009, Nordahl Land Surveying 2009, RMT Inc. 2009, and Balance Hydrologics 2009

LEGEND

- Monitoring Well
- Piezometer
- Ione WWTP Pond
- Inferred Ground Water Level

Inferred groundwater levels in the alluvial aquifer south of Sutter Creek, January 12-13, 2009, prior to the onset of recharge during this very early dry part of winter. These water levels are based on new off-site monitoring wells installed during the study.

Google

Balance Hydrologics, Inc.

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Castle Oaks Golf Course

The Castle Oaks Golf Course monitoring wells were installed in October 1994. Data on groundwater elevations and concentrations of several water quality constituents (i.e., TDS, pH, nitrate, ammonia, and coliform bacteria) are available from 2001 to the present. Monitoring of iron, manganese, and total organic carbon (TOC) concentrations began in 2004, while chloride and sodium monitoring began in 2006.

As noted in the annual monitoring reports, while groundwater gradients in the area of the golf course are generally from the northeast to southwest, the pattern of TDS concentrations in the three wells has been inconsistent in establishing a trend from upgradient to downgradient locations, as listed in Table 3.1-1. The pattern of annual fluctuations in TDS concentrations differs substantially among the three wells. Concentrations in upgradient well CO MW-1 and downgradient well CO MW-3 tend to peak in mid-winter, then decline during the irrigation season. In contrast, TDS concentrations in intermediate well CO MW-2 show the opposite pattern, with the highest levels in late fall and the lowest values in winter and spring. From the measurements, however, it can be concluded that:

1) Ambient background TDS concentrations in all three golf course wells exceed concentrations in the treated effluent;
2) Treated effluent dilutes TDS concentrations in the two wells where ambient concentrations more nearly match those of the applied effluent;
3) Dry-season groundwater inflows from additional sources having elevated TDS concentrations mask any effect of effluent dilution on TDS concentrations in CO MW-3; and
4) Review of water-level measurements indicates that upgradient well CO MW-1 is influenced by temporary irrigation water storage in the adjacent golf course pond (Pond A), as shown by elevated groundwater levels during dry periods when treated effluent is being applied to the course.

Although TDS concentrations in the secondary treated wastewater have been decreasing during the period of record, there appears to be a slight increasing trend in TDS in all three monitoring wells on the Castle Oaks Golf Course. While the period of record is much shorter (2006 to the present), a similar, but less distinct increasing trend is seen in chloride concentrations in CO MW-1 and CO MW-2. The cause of this trend is unknown but may be explained by climate considerations. Annual rainfall in water years 2007 and 2008 was less than 70 percent of average. To date, water year 2009 rainfall has also been below average. During dry years, less precipitation is available for recharge and dilution. As observed for TDS, ambient groundwater chloride concentrations in all three golf course wells exceed concentrations in the secondary treated

Table 3.1-1: Castle Oaks Golf Course Monitoring Well Water Quality Data – Average Concentrations

Parameter	CO MW-1	CO MW-2	CO-MW-3
TDS (2003 to 2006)	361 mg/L	1,058 mg/L	302 mg/L
Chloride (2006 to 2009)	58 mg/L	154 mg/L	32 mg/L
Sodium (2006 to 2009)	31 mg/L	79 mg/L	32 mg/L
Nitrate-N (2005 to 2008)	4.8 mg/L	2.0 mg/L	0.15 mg/L
Total Manganese (2004 to 2009)	0.06 mg/L	0.02 mg/L	0.14 mg/L
Total Iron (2004 to 2009)	1.9 mg/L	0.66 mg/L	11.0 mg/L

SOURCE: City of Ione, 2009

wastewater, which average about 29 mg/L. As noted above, the Title 22 California Drinking Water secondary MCL for TDS is 500 mg/L. For chloride, the Title 22 California Drinking Water secondary MCL is 250 mg/L.

Lower chloride concentrations at CO MW-3 as compared to CO MW-1 suggest dilution due to reclaimed wastewater irrigation. Elevated chloride concentrations at CO MW-2 are consistent with an interpretation that groundwater in this area is influenced by contributions from the Ione formation.

Like chloride, average sodium concentrations in all three golf course wells exceed the average sodium concentration in treated effluent of about 35 mg/L for the limited period of record (2006 to present). There is no Title 22 primary or secondary MCL for sodium.

Nitrate, the product of microbial oxidation of ammonia-nitrogen, is of concern as a possible indicator of effluent (and certain other sources, including agricultural return flows). In addition, nitrates are deemed biostimulatory substances, and at high concentrations can have public health effects, such as methemoglobinemia, or "blue baby syndrome". The Title 22 California Drinking Water primary MCL for nitrate-N is 10.0 mg/L. From 2005 to 2008, nitrate-nitrogen (nitrate-N) concentrations in the treated effluent averaged about 3.5 mg/L. Nitrate-N concentrations in all three golf course wells follow a different pattern than other wastewater constituents. The unexplained spike of 20 mg/L measured at CO MW-1 well in April 2005 was subsequently followed by a spike of 13 mg/L observed at CO MW-2 during the following quarter (July 2005). Over the longer 2002-2008 period, nitrate-N concentrations in CO MW-2 were typically less than 1.0 mg/L, indicating that most of the nitrate in groundwater was denitrified during passage beneath the golf course. Ammonia was not detected in any of the wells during the period of record.

Laboratory analyses for metals in water samples typically report concentrations for both the total and dissolved forms of each metal. The dissolved form of a metal is obtained by filtering the sample through a filter to remove fine particulates suspended in the water. Dissolved metals are more bioavailable and of greater potential concern for those metals where toxicity is an issue, such as chromium, copper, or lead. The primary issues regarding elevated concentrations of dissolved manganese are aesthetic (taste, odor, and color), not health-related. Manganese concentrations averaged 0.06 mg/L in upgradient well CO MW-1, none of which was in the dissolved form. In contrast, manganese concentrations averaged 0.14 mg/L in downgradient well CO MW-3, with nearly all of the manganese in the dissolved form. As discussed below for the City WWTP, dissolution of manganese from substrate (soil, bedrock) is favored by low-oxygen conditions that may result from application of treated effluent. Manganese concentrations beneath the golf course were much lower in the Ione formation-influenced intermediate downgradient well CO MW-2, and 80 to 100 percent of the manganese was in the dissolved form at this location. The Title 22 secondary MCL for manganese is 0.05 mg/L. Though the manganese levels found in some of the monitoring wells exceeded this Title 22 standard, manganese does not represent a health-related concern, and so the existing WWTP's impact on manganese levels is not considered significant.

Iron was detected in approximately half of the samples collected from CO MW-1. The average iron concentration in this well was 1.9 mg/L (non-detects were treated as zero) with a notable spike of 13.6 mg/L on November 30, 2008 in this well. Dissolved iron, which like dissolved manganese typically forms in low-oxygen environments, was only detected once in CO MW-1 and comprised a very small proportion (only 2.4 percent) of the total iron concentration. Iron concentrations were much lower in intermediate downgradient well CO MW-2 where the average concentration was 0.66 mg/L, of which 10 to 39 percent was in the dissolved form. The highest iron levels were measured in downgradient well CO MW-3 where concentrations averaged 11.0 mg/L, with a notable spike of 48.2 mg/L on May 30, 2006. The dissolved fraction of iron at CO MW-3 averaged 48 percent. Effluent application on the golf course appears to result in low-oxygen conditions in the underlying aquifer, which is promoting dissolution of iron from the soil and/or bedrock. The primary

Table 3.1-2: Mule Creek State Prison Monitoring Wells - Water Quality Data – Concentrations Ranges

Constituent	Upgradient wells	Downgradient wells
TDS	509 to 1,320 mg/L	272 to 679 mg/L
Nitrate-N	0.13 to 29 mg/L	Non-detect to 6.6 mg/L
Manganese	0.06 to 0.68 mg/L	Non-detect to 0.08 mg/L

Table 3.1-3: Total Dissolved Solids Concentrations in Sutter Creek and in Wells South of Sutter Creek on March 11, 2009

Monitoring Site	TDS Concentration	Comment
Sutter Creek, upstream	165 mg/L	At utility bridge above City WWTP
Sutter Creek, downstream	160 mg/L	Just downstream of City WWTP
Upgradient wells MW-1, MW 08-4A, MW 08-4B2	200 to 236 mg/L	Located east of the City WWTP
Wells near the City WWTP	240 to 270 mg/L	Wells MW-1A, MW-2, MW-3A, MW-4, MW-4A, MW-5A
Well MW-3	340 mg/L	Located immediately west (downgradient) of treatment pond 4
Off-site wells MW 08-3, MW 08-2A, MW 08-2B	650 to 2,080 mg/L	Located south of the City WWTP
Off site well MW 08-1	449 mg/L	Located on Sparrowk Ranch, southwest of the City WWTP

The longer period of record (2002 to 2009) for wells MW-1, MW-2, MW-3, and MW-4 allows for analysis of trends in TDS concentrations. In general, TDS concentrations are highest in fall and lowest in spring; however, this pattern is not consistent in all wells (particularly MW-3) and all years. Longer-term wet and dry cycles also seem to influence TDS concentrations through dilution. In most wells, TDS concentrations were highest in spring 2004 following four relatively dry years. TDS concentrations were relatively low throughout 2005 and 2006 (both wet years), then rose again in winter 2007/2008 following the dry year of 2007.

Chloride, a major component of TDS, shows more distinct trends. Chloride concentrations in most wells were relatively constant between July 2002 and September 2007. Chloride concentrations in all four wells began to rise beginning in December 2007, despite no similar increase in chloride concentrations in the effluent discharged to the ponds. The increases appear to be due to relatively dry climate conditions, and chloride concentrations remain well below the Title 22 secondary MCL threshold for chloride of 250 mg/L.

Nitrate-nitrogen (nitrate-N) concentrations from 2002-2009 were below the Title 22 MCL of 10 mg/L nitrate-N at all surface and groundwater monitoring sites south of Sutter Creek.

Manganese concentrations have been higher in the downgradient wells than in upgradient off-site wells or in Sutter Creek, although almost all stations have reported concentrations exceeding the Title 22 secondary MCL of 0.05 mg/L on one or more occasions. The secondary WWTP has not been implicated as the source of manganese. Rather, measurements show that there are conditions that favor dissolution of manganese from the substrate, downgradient of the percolation ponds. Given the low nitrate-N concentrations observed downgradient from the ponds, and the fact that most of the manganese in the downgradient wells is in the dissolved form, it appears likely that microbial denitrification of percolating effluent is depleting oxygen levels and increasing mobilization of manganese (and other metals, such as iron) from the subsoil horizons.

3.1.2 REGULATORY SETTING

Federal and State Regulations

Federal and state water quality regulations apply to projects that may adversely affect the quality of surface waters or groundwater through the discharge of wastewater and/or stormwater. The California State Water Resources Control Board (State Board) and the nine California Regional Water Quality Control Boards (Regional Board or RWQCB) have the authority in California to protect and enhance water quality, both through their designation as the lead agencies in implementing the Section 319 nonpoint source program of the federal Clean Water Act (CWA), and from the state's primary water-pollution control legislation, the Porter-Cologne Water Quality Control Act. CWA Section 303 and the Porter-Cologne Water Quality Control Act establish water quality objectives for all waters in the State. These objectives are implemented locally through Water Quality Control Plans, the National Pollutant Discharge Elimination System (NPDES) permits, and waste discharge requirements.

Because hydrology is inextricably linked to ecosystem and wildlife health, the California Department of Fish and Game also has regulatory oversight over projects that affect lakes, streambeds, and adjacent riparian zones. Section 404 of the CWA gives the U.S. Army Corps of Engineers (ACOE) authority to regulate discharges of dredged or fill material into Waters of the United States. The Rivers and Harbors Act of 1899 prohibits the unauthorized construction of structures in, under, or over navigable waters.

Central Valley Region Water Quality Control Plan

The Central Valley Region (Region 5) office of the RWQCB guides and regulates water quality in streams and aquifers of the Sacramento-San Joaquin Valley through designation of beneficial uses, establishment of water quality objectives, administration of the NPDES permit program for stormwater and construction site runoff, and Section 401 water quality certification where development results in fill of jurisdictional wetlands or waters of the US under Section 404 of the Clean Water Act.

The Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins presents the beneficial uses that the Regional Board has specifically designated for local aquifers, streams, marshes, rivers, and the Delta, as well as the water quality objectives and criteria that must be met to protect these uses. The project site drains to Sutter Creek and Mule Creek (tributaries of Dry Creek, which empties into the Cosumnes River). While beneficial uses have not been designated for these three creeks, existing and potential beneficial uses for the Cosumnes River would also apply upstream to the extent that flows in these tributaries could logically support the similar uses. During times when Sutter Creek and Mule Creek are flowing, applicable beneficial uses include:

- Municipal and agricultural water supply
- Contact and non-contact aquatic recreation
- Warm and cold freshwater wildlife habitat
- Migration of aquatic organisms
- Fish spawning

The existing seepage on the south bank of Sutter Creek already has a minimal and less than significant impact on the water quality of the Creek. The partial lining or filling of Ponds 5 and 6 and the conversion of disposal from secondary treated wastewater to tertiary treated wastewater would further improve the water quality of any water seeping into Sutter Creek. The project would therefore have a less than significant impact on the water quality of Sutter Creek, and no mitigation is required. However, recommended measure Hydrology-1 has been added to monitor the seepage and document any changes in the quantity or quality of the seepage flow.

> **Recommended Measure Hydrology-1:** The City shall conduct quarterly monitoring of the seepage on the south bank of Sutter Creek within the vicinity of the secondary WWTP. This monitoring data shall be supplied to the RWQCB upon request. If the monitoring data indicate that the wastewater treatment plant operations are impacting Sutter Creek, then the City shall retain a qualified hydrogeologist to evaluate the impacts and identify appropriate measures to address such impacts.

The only way to eliminate any seepage of groundwater to Sutter Creek is to install a curtain wall along the entire length of West Marlette Street between the secondary WWTP and Sutter Creek. This curtain wall would consist of a vertical clay barrier extending from the ground surface down to the Ione formation. Such a barrier would eliminate all seepage of groundwater along this portion of the creek bank, including natural seepage. Installation of a curtain wall would be a significant impact, as it would eliminate natural groundwater recharge of Sutter Creek along the length of the wall, and would raise groundwater elevations at the secondary WWTP and interfere with the percolation of treated wastewater. Due to these impacts, installation of a curtain wall has not been included as an element of the proposed project.

The area of new impermeable surfaces potentially available to generate additional surface runoff and degrade runoff water quality will either be unchanged (if ponds are lined) or increase slightly (if the ponds are partially filled) once Ponds 5 and 6 have been modified. The filled-in portions of the two ponds would be level-graded and, if the area is not used for construction of an activated sludge treatment system (see below), would have only a limited potential to impact runoff water quality once the modifications have been completed. Preparation and implementation of a SWPPP for the project as required in mitigation measure Hydrology-1 would reduce potential impacts of Pond 5 and 6 modifications on post-construction runoff water quality to a less than significant level.

Activated Sludge System

Construction. As described in Chapter 2: Project Description, three potential locations have been identified for construction of an activated sludge treatment system to (1) replace the current four-pond treatment complex at the City WWTP, and (2) increase the City's wastewater treatment capacity. These three locations include the area directly south of Ponds 1-4, the northern portions of Pond 5 and 6 if these areas are filled and not lined, and the land immediately to the west of the existing tertiary WWTP. Construction of the activated sludge treatment system at any of these three locations would involve grading, excavation, and soil stockpiling over an area ranging from 3 acres for an enclosed, underground system to 8 acres for an open, unenclosed system. All three location options pose a potential risk of soil erosion or mobilization of pollutants and sediment during construction unless suitable control measures are implemented. The risk would be greater for the open, unenclosed alternative because of the larger construction area and the more dispersed configuration of the facilities. Some of the same factors limiting potential construction-phase impacts of modifications to Ponds 5 and 6 on runoff volumes and water quality, as discussed above, would also apply to construction of the activated sludge treatment system.

Construction of the activated sludge treatment system would take place over an estimated 10-month period; therefore, work would not be limited to the dry season. Control of construction-phase runoff would be particularly important at the two possible locations on either side of Sutter

The two streams are not known to support summer rearing of anadromous fish[5]; however, the Cosumnes is known to support these activities.

Water quality objectives established in the Basin Plan to protect the beneficial uses from the types of potential pollutants that could be generated by the project are included in Table 3.1-4.

Table 3.1-4: Basin Plan Water Quality Objectives to Protect Beneficial Uses

Parameter	Water Quality Objective
Dissolved Oxygen	5.0 mg/L minimum in waters designated WARM 7.0 mg/L minimum in waters designated COLD 7.0 mg/L minimum in waters designated SPWN The monthly median of the mean daily dissolved oxygen concentration shall not fall below 85 percent of saturation in the main water mass, and the 95 percentile concentration shall not fall below 75 percent saturation.
Salinity	Electrical conductivity shall not exceed 150 micromhos/cm.
Suspended Material and Settleable Material	Waters shall not contain substances or suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
Sediment	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in turbidity attributable to controllable water quality factors shall not exceed: 1 NTU where natural turbidity is between 0 and 5 NTUs; 20 percent where natural turbidity is between 5 and 50 NTUs; 10 NTUs where natural turbidity is between 50 and 100 NTUs; or 10 percent where natural turbidity is greater than 100 NTUs.
pH	The pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in fresh waters designated with COLD or WARM beneficial uses.
Oil and Grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in visible film or coating on the surface of the water or on objects in the water, or that otherwise adversely affect beneficial uses.
Floating Material	Waters shall not contain floating material in amounts that cause nuisance or adversely affect beneficial uses.
Temperature	The natural receiving water temperature intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses. At no time or place shall the temperature of COLD or WARM intrastate waters be increased more than 5°F (2.8°C) above natural receiving water temperature.
Toxic Pollutants	All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances. Compliance with this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, and biotoxicity tests of appropriate duration or other methods as specified by the RWQCB. Numeral objectives for arsenic, barium, boron, copper, cyanide, iron, manganese, molybdenum, selenium, silver, and zinc are provided in the Basin Plan.
Pesticides	No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses.

Source: Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins, RWQCB 1998

[5] Anadromous fish are species, such as salmon or sturgeon, that migrate from salt water to spawn in fresh water.

On May 18, 2000, the U.S. EPA published the California Toxics Rule (CTR) in the Federal Register, adding Section 131.38 to Title 40 of the CFR and establishing new water quality objectives for some constituents in the Basin Plans. On May 22, 2000, the Office of Administrative Law approved, with modifications, the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Phase 1 of the Inland Surface Waters Plan and Enclosed Bays and Estuaries Plan). The Policy establishes implementation procedures for three categories of priority pollutant criteria or water quality objectives. These are

1) Criteria promulgated by the U.S. EPA in the National Toxics Rule that apply in California;
2) Criteria proposed by the U.S. EPA in the California Toxics Rule; and
3) Water quality objectives contained in RWQCB Basin Plans.

NPDES Municipal Stormwater Permit

The 1987 amendments to the CWA (Section 402[p]) provided for U.S. EPA regulation of several new categories of nonpoint pollution sources within the existing NPDES program. In Phase I, NPDES permits were issued for urban runoff discharges from municipalities of over 100,000 people, from plants in industries recognized by the U.S. EPA as being likely sources of storm water pollutants, and from construction activities that disturb more than 5 acres. Phase II implementation, effective March 10, 2003, extended NPDES urban runoff discharge permitting to cities of 50,000 to 100,000 people, and to construction sites which disturb between 1 and 5 acres.

The U.S. EPA has delegated management of California's NPDES Municipal Stormwater Permit program to the State Board and the nine Regional Boards. In Phase I and Phase II, urbanized counties and cities that implemented a comprehensive stormwater management plan (CSWP) for urban runoff management meeting RWQCB standards could apply to the Regional Board for a joint city-county NPDES Municipal Stormwater Permit. Upon acceptance, the authority to regulate storm runoff discharges from municipal storm drain systems was transferred to the permit holders, allowing them to more effectively integrate the storm-water control program with other nonpoint source control programs. At present, the Central Valley Regional Board continues to administer the NPDES program in Amador County under the state's NPDES General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4).

NPDES General Permit for Discharges of Storm Water Associated with Construction Activity

Since the proposed project would disturb more than 1 acre of land, the project applicant would be required to submit a Notice of Intent to the State Board and apply for coverage under the NPDES Construction General Permit. Administration of these permits has not been delegated to cities, counties, or Regional Boards but remains with the State Board. Enforcement of permit conditions, however, is the responsibility of Regional Board staff, assisted by local municipal or county staff. The City of Ione will require the project contractor to prepare a Storm Water Pollution Prevention Plan (SWPPP) and submit it for review prior to commencing construction. Once grading begins, the SWPPP must be kept on-site and updated as needed while construction progresses. The SWPPP details the site-specific best management practices (BMPs) to control erosion and sedimentation and maintain water quality during the construction phase. The SWPPP also contains a summary of the structural and non-structural BMPs to be implemented during the post-construction period, pursuant to the nonpoint source practices and procedures encouraged by the Central Valley office of the Regional Board.

The State Board is in the process of revising the Construction General Permit. The latest draft of the new permit was released in May 2009 and the permit is expected to be reissued and adopted in 2009. The new draft permit, in its current form as of the date of this EIR, establishes technology-based numeric action levels (NALs) for pH and turbidity that, if exceeded, would trigger the need for further action. In addition, depending on the level of risk assigned to the project, technology-based numeric effluent levels (NELs) for pH and turbidity discharges would be required. The draft permit requires effluent monitoring and reporting for pH and turbidity in storm water discharges to determine whether NALs have been exceeded and whether the project complies with NELs. All sites would additionally be required to meet new development and redevelopment performance standards to minimize or mitigate hydrologic impacts.

Recycled Water Policy

On May 14, 2009, in support of the state's Strategic Plan priority to Promote Sustainable Local Water Supplies (which promotes the use of recycled water), the State Board adopted a policy for water quality control for recycled water (State Board Resolution No. 2009-0011). The Recycled Water Policy encourages beneficial use of, rather than solely disposal of, recycled water. In response to this new policy, the State Board is in the process of developing a Statewide General Permit for Landscape Irrigation Uses of Recycled Water and issued a Draft General Permit on May 7, 2009. The Draft General Permit applies to disinfected tertiary recycled water produced by a public entity at a municipal wastewater treatment plant. The Draft General Permit recommends submittal of a Notice of Intent (NOI) form and establishes terms and conditions of discharge to ensure that the discharge does not unreasonably affect present and anticipated beneficial uses of groundwater and surface water. Requirements in the Draft General Permit include: application of recycled water at agronomic rates to prevent infiltration to groundwater, prohibitions against direct or indirect discharge to surface waters, a minimum 50-foot buffer zone around domestic wells, development of a Monitoring and Reporting Program, and a number of other housekeeping measures. To the extent that the final permit as adopted establishes requirements not currently included in the existing Waste Discharge Requirements (WDR) for the COWRP (Order 93-240), the City intends to seek a single WDR which will include master water reclamation requirements to permit the use of Title 22 effluent from either existing COWRP or the proposed new treatment facility for crop irrigation, landscape irrigation, industrial use, and all other uses permitted under Title 22.

Constituents of Emerging Concern (CECs)

CECs include a diverse group of chemicals, such as pharmaceuticals and personal care products (PPCPs) and endocrine disrupting compounds (EDCs). These CECs are increasingly found in treated wastewater as advances in analytical chemistry methods allow detection of pollutants in progressively smaller concentrations. Compounds commonly detected in wastewater effluent or receiving waters downstream of wastewater treatment plants include: cholesterol, estrogens (e.g., coprostanol), insect repellents (e.g., DEET), caffeine, triclosan, analgesics (e.g., salicylic acid, ibuprofen, and acetaminophen), antibiotics (e.g., amoxicillin, erythromycin), tranquilizers, synthetic fragrances, soaps and surfactants, and insect repellents. CECs are introduced into the wastewater system through a variety of pathways, including: excretion following human use; expired and unused products flushed down sinks or toilets; and release of unabsorbed externally-applied products during washing or bathing.

CECs are an emerging issue, and the potential effects of many of these biologically active chemicals on humans and aquatic ecosystems are poorly understood due to the number of potential constituents involved (the compounds and their breakdown products and/or metabolites), the low concentrations, the lack of information on additive and synergistic effects of mixtures of CECs, effects of sub-therapeutic doses or continual long-term exposure to low concentrations, and the environmental fate and degradation characteristics. Concentrations of CECs in wastewater, surface water, and groundwater are typically very low, which limits the potential for human exposure. For humans, the primary routes of exposure to PPCPs include consumption of potable water or fish that contain CECs and their derivatives.

While extensive mammalian and human toxicity data are available for pharmaceuticals subject to the drug development and approval process, the amount of monitoring data available on the prevalence and concentrations of other CECs in the environment and the resulting risks to humans and wildlife is currently very limited. One group of CECs, endocrine disrupting compounds (EDCs), mimics the natural endocrine hormones of animals. Most evidence for adverse effects of EDCs on animals focuses on resident aquatic organisms (fish, invertebrates) immediately downstream of urbanized areas, livestock production facilities, or direct wastewater discharges into receiving waters. At present, there are no federal regulations specific to pharmaceuticals in drinking or natural waters and concentrations of CECs in wastewater are typically not monitored. The most applicable state regulation is the RWQCB's Basin Plan narrative water quality objective for toxicity (Table 3.1-4), which states that all waters should be free of substances that produce detrimental effects in living organisms.

The current scientific assessment is that CECs in tertiary treated wastewater pose a much lower risk of human health effects than for conventional constituents of concern, such as nitrates or pathogens (bacteria, viruses, protozoans); however, potential effects will continue to be studied at the state and federal levels. If the City of Ione project advances, the City will need to seek modifications to the existing WDR or a new WDR, at which time RWQCB staff will evaluate the proposed wastewater treatment plant design, and operations and management as part of project permitting, including plans for treated effluent disposal and re-use. If approval is granted, then the resulting WDR will include control measures for surface and groundwater quality protection that would minimize exposure to PPCPs in treated wastewater. Examples of typical management measures include:

- Setting an appropriate irrigation rate for the soil type, slope and crop;
- Avoiding watering under saturated conditions that would cause direct runoff; and
- Delineating no-application buffer zones adjacent to stream channels and wetlands.

Local Regulations

Amador County General Plan

The current Amador County General Plan Land Use, Open Space, Conservation, and Scenic Highways Element (Amador County 1993b) includes the following goals, objectives and policies related to hydrology and water quality:

- To preserve, protect and where appropriate, promote the development of natural resources in water, minerals, timber and soils resources (Plan objective).
- To protect, and carefully develop where appropriate, the varied resources for public recreation in scenic and historical areas, hunting and fishing areas, lakes and waterways, forests and wilderness, and urban open spaces (Plan objective).
- To give careful consideration to the protection of natural resources and environmental assets in all future major public and private development planning (Action Program, Open Space Element)

The draft updated Amador County General Plan Preliminary General Plan Goals and Policies (Attachment B, Sept. 2008) includes the following goals, objectives, and policies:

- Goal LU-10: Ensure adequate wastewater treatment capacity exists to serve the county's population.

- Policy LU-10.1: Work with the County's cities and the Amador Water Agency to ensure that potential locations for wastewater treatment are protected from nearby incompatible uses.
- Policy LU-10.3: Encourage the use of reclaimed water for irrigation, mining, and compatible agricultural, commercial and industrial applications wherever possible in order to reduce the loading of the wastewater system and wastewater storage and disposal needs, and extend available water supplies.
- Policy LU-10.5: Encourage countywide regional coordination and organizational structures to fully implement maximum recycled water reuse opportunities throughout Amador County.
- Policy OS-4.6: Protect aquatic habitats from effects of erosion, siltation, and alteration.

City of Ione General Plan

The City of Ione draft General Plan (2009) includes the following goals, policies and actions related to hydrology and water quality:

- Policy CO-2.1: Coordinate with relevant State and local agencies, property owners, and local interest groups to restore, enhance, and preserve creeks in and around the City of Ione. Public and private projects shall be required to avoid impacts to wetlands if feasible. If avoidance is not feasible, projects shall achieve no net loss of wetlands, consistent with State and federal regulations.
- Policy CO-4.2: Encourage the use of treated wastewater to irrigate parks, golf courses, and landscaping. In new development areas, the use of treated wastewater for irrigation may be applied as a condition of approval subject to State permitting. (*Cross reference PF 3.1.2*)
- Action CO-4.4.4: Require the use of best management practices to protect receiving waters from the adverse effects of construction activities, sediment, and urban runoff.
- PF-3.1.2: The City shall allow the use of reclaimed water for landscape irrigation at existing parks and the Castle Oaks Golf Course, when permitted by state regulations. If available, the City shall use reclaimed water for landscape irrigation at all new: parks, non-residential landscaped areas, multifamily landscaped areas, and subdivisions for single-family homes. The City shall consider use of reclaimed water for landscape irrigation for non-residential landscaped areas.
- Action PF-3.1.3: The City shall work with property owners, farmers, mining companies, and other public agencies to assess the feasibility of providing reclaimed water to lands around the City, when permitted by state regulations. This shall include agricultural operations, existing mining sites, former mine sites, and to other public water agencies. Expansions of the wastewater treatment facilities and infrastructure shall be consistent with RWQCB requirements.
- Action PF-6.1.2: The City shall require appropriate runoff control measures as part of future development proposals to slow runoff, maximize on-site infiltration, and minimize discharge or urban pollutants into area drainages.

3.1.3 THRESHOLDS OF SIGNIFICANCE

The proposed project would result in a significant impact if it would:

1) Violate any water quality standards or waste discharge requirements, or cause increased erosion and siltation or otherwise degrade water quality.
2) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells

would drop to a level which would not support existing land uses or planned uses for which permits have been granted).

3) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.
4) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
5) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary of Flood Insurance Rate Map or other flood hazard delineation map, or place structures within a 100-year flood hazard area that would impede or redirect flood flows.
6) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

3.1.4 IMPACTS AND MITIGATION

The hydrologic, drainage and water quality assessments of the proposed project contained in this section are based upon:

a. Prior hydrologic and hydrogeologic analyses conducted for the City of Ione;
b. Site observations by Balance Hydrologics staff as described here and in Appendix D
c. Preliminary plans and studies prepared by engineering consultants for the City's Wastewater Master Plan; and
d. General information on soils in the area of the project site from the USDA Soil Conservation Service (presently, Natural Resources Conservation Service, or NRCS) Soil Survey of the Amador Area (Sketchley 1965).

Potential Impact 3.1-1: The potential to violate any water quality standards or waste discharge requirements, or cause increased erosion and siltation or otherwise degrade water quality

Existing Infrastructure

Pond 7

Construction. Construction of Pond 7 did not interfere with local drainage because the City WWTP is not subject to run-on and no streams or drainages cross the facility. Construction of Pond 7 involved grading, excavation, and soil stockpiling over an area exceeding 1 acre. These activities could have adversely impacted runoff quality through two major pathways, including release of pollutants from equipment operation and maintenance during construction, and erosion from project lands during or following construction.

Risks of water quality impacts from rainfall and subsequent runoff during project construction were minimal because construction was undertaken during the dry season. The amount of runoff draining from the site would have been limited due to the minimal size of the construction area surrounding the new pond.

Under normal circumstances, the City or its contractor would have been required to apply to the State Board for coverage under the NPDES Construction General Permit, then prepare and implement a SWPPP prior to commencing construction because the project disturbed more than 1 acre of land. However, Pond 7 was constructed and put into operation rapidly (21 days) to address a pressing need for increased wastewater disposal capacity under an emergency exemption from CEQA (later successfully challenged in a lawsuit) and neither an Erosion and Sediment Control Plan (ESCP) nor a Storm Water Pollution Prevention Plan (SWPPP) was prepared for the construction of Pond 7.

The potential vulnerability of the project site to erosion was limited due to a number of factors, including:

- The hydrologic setting;
- The project site is nearly level with no run-on;
- Most of the footprint for Pond 7 construction comprised areas previously disturbed and compacted earlier during construction of the other six ponds; and
- Construction of Pond 7 occurred during the dry season, further limiting the potential for runoff. Any runoff from the construction area, which is located in the southeast quadrant of the site, would have drained to the surrounding fields, rather than to Sutter Creek or another sensitive receiving water.

Based on the above factors, the impacts of Pond 7 construction on water quality and waste discharge requirements were likely less than significant.

Leaks were found in Pond 7 approximately four years post-construction, and plans were made to repair it. An ESCP was prepared and implemented for these repair activities. However, a Notice of Intent seeking coverage under the NPDES Construction General Permit was not filed with the State Water Resources Control Board, although a SWPPP was drafted by the City Engineer, resulting in the construction of the two stormwater retention basins at the southern portion of the property.

Potential temporary impacts of the leakage included:

- Violating conditions of the facility's operating permit from the RWQCB;
- Risk of water quality impacts from discharges to the surrounding fields; and
- Risk of water quality impacts if discharges were to enter downstream receiving waters.

The Regional Board Waste Discharge Requirements (WDR) Order No. 95-125 (adopted May 26, 1995) prohibits treated effluent discharges other than through evaporation or percolation through the bottom of the treatment ponds. Lateral leakage from Pond 7 into the surrounding fields was a violation of the WDR. The City subsequently addressed the problem through reconstruction of Pond 7 and installation of a liner, as required by the Regional Board.

The effluent discharged into Pond 7 for disposal has been treated to secondary standards. Current regulations permit application of non-disinfected secondary effluent on pastures supporting grazing as long as the livestock are not producing milk for human consumption. The pastures adjacent to the City WWTP are used to graze beef cattle. The temporary release of secondary treated wastewater through lateral leaks in Pond 7 represented a less than significant impact to the extent that the leaking effluent was accidentally discharged to these fields, and subsequently evaporated or percolated to groundwater through the soil column.

Leakage of the secondary treated wastewater into ditches adjacent to Pond 7 could potentially have impacted downstream waters if the ditches were actively draining to a stream or wetlands areas, as was likely the case following the major storm periods of late December 2005, and January and April 2006. The temporary release of secondary treated wastewater through lateral leaks in Pond 7 to these adjacent ditches represented a less than significant impact because natural runoff from the much larger unaffected contributing area during wet conditions would have diluted effluent constituent concentrations to below levels of concern prior to discharge.

Operation. During the period prior to discovery of leakage from Pond 7, and following pond reconstruction, all evidence is that Pond 7 performed similarly to the other disposal ponds in providing adequate treatment of secondary effluent as it percolated through the pond bottom to the groundwater table. Based on review of the groundwater monitoring data (see Appendix D), the additional groundwater disposed of through operation of Pond 7 would have slightly increased groundwater levels in a system already experiencing elevated groundwater tables. This may have caused water levels to rise further in off-site areas to the southwest where high groundwater was already apparent, although data are insufficient to estimate the magnitude or duration of the higher groundwater levels. However, the greatest potential impact would be on water quality, as the Regional Board's Basin Plan recommends that 10 feet of separation be maintained between the bottom of disposal ponds and the groundwater table. The bottom of Pond 7 is at elevation 262 feet amsl, while water levels in the monitoring wells and piezometers bordering the City WWTP remained above 253 feet amsl, and often within 5 feet of the bottom of Pond 7, from 2002 to 2008. Yet despite regularly exceeding the threshold for groundwater separation, operation of Pond 7 has not been found to be associated with any impacts to water quality, and levels of wastewater constituents, including bacteria, in downgradient monitoring wells have remained below levels of regulatory concern.

Part I – Treatment

Line or Partially Fill Ponds 5 and 6

Construction. As described in Chapter 2: Project Description, the City has proposed to partially fill or install an impermeable liner in those portions of percolation Ponds 5 and 6 at the northern end of the City WWTP that are within 200 feet of Sutter Creek. This action is intended to address Regional Board concerns, as described in Cease and Desist Order R5-2003-0108 (dated July 11, 2003), that seepage noted along the south bank of Sutter Creek adjacent to the facility was actually an unpermitted discharge of treated effluent to the creek.

The secondary WWTP is not subject to run-on, and no streams or drainages cross the facility. Partially filling or lining Ponds 5 and 6 would not interfere with local drainage; however, construction activities such as grading, excavation, and soil stockpiling over an area exceeding 1 acre would likely occur. These activities could significantly impact runoff quality through two major pathways, including the release of pollutants from equipment operation and maintenance during construction, and erosion from the project site during or following construction. Construction would occur during the dry season; therefore, the risk of rainfall and runoff would be minimal. Most of the same factors limiting potential construction-phase impacts of lining or partially filling Ponds 5 and 6 would be similar to those for activities related to Pond 7. Control of runoff water quality during construction would be more important for the proposed changes to Ponds 5 and 6 because the work would occur directly across West Marlette Street from Sutter Creek, which could be impacted by sediment and other constituents in uncontrolled runoff.

Potential construction-phase pollutant impacts from development would be mitigated to less than significant levels through implementation of mitigation measure Hydrology-1, which includes preparation and implementation of an ESCP and a SWPPP consistent with recommended design criteria, in accordance with the NPDES permitting requirements enforced by the State Board. The ESCP forms a significant portion of the construction-phase controls required in a SWPPP, which also details the housekeeping measures for control of contaminants other than sediment during construction, as well as the treatment measures and best management practices (BMPs) to be implemented for control of pollutants once the project has been constructed. Preparation and implementation of an ESCP and a SWPPP for the project would reduce potential impacts of Pond 5 and 6 modifications on runoff water quality and quantities to a less than significant level.

Mitigation Measure Hydrology-1: The Applicant shall prepare and submit an Erosion and Sediment Control Plan (ESCP) for review and approval by the City of Ione prior to issuance of a grading permit for lining and/or filling ponds 5 and 6. The ESCP shall include the locations and descriptions of control measures (BMPs), such as straw bale barriers, straw mulching, straw wattles, silt fencing, and temporary sediment ponds to be used at the project site to control and manage erosion and sediment, control and treat runoff, and promote infiltration of runoff from new impervious surfaces.

The Applicant shall also submit a Notice of Intent (NOI) to the State Water Resources Control Board for coverage under the NPDES Construction General Permit and prepare and submit a Storm Water Pollution Prevention Plan (SWPPP) for review and approval by the City of Ione prior to issuance of a grading permit. The SWPPP shall incorporate the ESCP and describe construction-phase housekeeping measures. The SWPPP shall also include descriptions and designs of the post-construction BMPs to be implemented. Where applicable (e.g., for bioswales or biofiltration features), BMPs shall be designed based on specific criteria from recognized BMP design guidance manuals.

Operation. Operation of Ponds 5 and 6 would remain similar to current operations after modification by fill placement and/or lining. Fill placement would reduce the Ponds' effluent storage and disposal capacity, while lining portions of the two ponds that are within 200 feet of Sutter Creek would reduce the disposal capacity but not substantially affect storage volumes. As explained below, either modification would reduce local seepage to Sutter Creek, considered by the RWQCB to be a potential violation of the prohibition on discharges of treated effluent to surface waters, to below the level of significance, indistinguishable from seepage occurring at other locations upstream and downstream in the Ione Valley where water levels in the alluvial aquifer seasonally exceed the elevation of surface water in the creek.

The 2003 Cease and Desist Order requires the City to submit a Facility Guidance Document explaining measures to be taken to reduce seepage from the City WWTP disposal ponds to Sutter Creek, in lieu of applying for an NPDES permit regulating surface discharges. In response to the CDO, the Facility Guidance Document submitted to the Regional Board in January 2004 suggested lining those portions of the currently-unlined disposal ponds within 200 feet of Sutter Creek as a means to eliminate seepage discharges to surface waters. Both the 2003 geotechnical study (WKA, 2003) and assessments completed for this CEQA document (described above under Existing Conditions) conclude that the amount of groundwater seepage from the area of the City WWTP to Sutter Creek is already very low, seasonally restricted, and comprises a mixture of treated effluent and ambient groundwater in unknown proportions. By providing an additional 100 feet of separation between Ponds 5 and 6 and Sutter Creek, partially lining or filling Ponds 5 and 6 would reduce seepage to the creek to even lower levels as more of the percolating effluent would flow along the primary groundwater flow path to the west and southwest. In addition, the increased distance from the creek would further enhance renovation of percolating effluent and also provide for greater mixing with ambient groundwater prior to any seepage entering Sutter Creek.

The quality of treated effluent evaporated or percolated through the pond bottoms would improve if the wastewater is treated to a tertiary level, as also proposed in this project. Existing percolate quality currently attains secondary treatment standards and effluent quality is further improved during percolation through the pond bottoms and passage to the groundwater table. Regular water quality monitoring at locations downgradient from the City facility has not demonstrated direct impacts due to inadequate wastewater treatment. The disposal of tertiary treated wastewater instead of secondary treated wastewater would further improve the quality of the treated effluent that is percolated into the groundwater table, and would further improve the quality of any groundwater that might seep into Sutter Creek.

Creek due to their close proximity to the creek. Construction at either of these two sites has a greater potential to affect Sutter Creek through sediment and other constituents mobilized by uncontrolled runoff. The City or its contractor would be required to prepare and implement an ESCP and a SWPPP, according to mitigation measure Hydrology-1, regardless of which of the three potential sites is chosen for the activated sludge system. Implementation of this mitigation measure would reduce the water quality impacts from the construction of an activated sludge system to a less than significant level.

Operation. The greatest risk of water quality impacts from operation of the activated sludge system would occur if rainfall or runoff that contacted the sludge were allowed to drain off-site without appropriate treatment. Mobilization of chemical pollutants and/or bacteria in the runoff could potentially impact downstream water quality and beneficial uses. Construction of an enclosed (covered) activated sludge treatment system at either facility would be sufficient to avoid risks of water quality impacts and reduce such impacts to a less than significant level.

Control of post-construction runoff would be particularly important at the two possible locations on either side of Sutter Creek due to their close proximity to the creek. Construction at either of these two sites has a greater potential to affect Sutter Creek with sediment or other constituents mobilized by uncontrolled runoff. Implementation of mitigation measure Hydrology-1would reduce potential operational impacts on runoff water quality of an underground and enclosed activated sludge treatment system at either of these two locations to a less than significant level.

An open, unenclosed activated sludge treatment system would require a larger area and would likely create a larger acreage of new impermeable surfaces than construction of an enclosed, underground system (8 acres versus 3 acres). Operation of an open and unenclosed system could potentially lead to accidental discharges unless drainage from the system is handled appropriately. The City would need to apply to the Regional Board for permission to expand the wastewater treatment and disposal facilities. Regional Board staff would then review and evaluate the application based on the design and intended operation of the proposed facilities and address any project-specific concerns. If approved, the Regional Board would then modify and condition the City's existing WDR or issue a new WDR to avoid potential water quality impacts from the new proposed processes and uses.

Implementation of mitigation measure Hydrology-2 would reduce potential water quality impacts from the operation of an open and unenclosed activated sludge system to a less than significant level. These mitigation measures include requirements for a facilities operation, maintenance, and monitoring (OMM) plan that would include construction of below-grade structures and facilities for handling wet sludge that would be constructed over reinforced concrete pads or lined with synthetic liners, preventing percolation of leachate[6] to groundwater and facilitating runoff capture.

Mitigation Measure Hydrology-2: The Applicant shall prepare and submit an operations, maintenance, and monitoring (OMM) plan to the Regional Board as part of the application for expansion of wastewater treatment plant facilities. The OMM plan shall include measures for containment, control, and treatment of runoff or leachate from the activated sludge system treatment and storage areas. Examples of suitable control measures may include lining below-ground facilities, siting facilities over concrete pads, or constructing sumps or installing tanks to retain flows, as deemed necessary. Suitable treatment facilities include measures such as draining or pumping the leachate into constructed treatment wetlands, or use of manufactured devices to filter pollutants prior to discharge. The plan shall provide for contingent routing of untreated wastewater in the event of equipment stoppages or upsets of the treatment ponds.

[6] Leachate is the solution resulting from percolation of water through a mass of permeable material. Typically, leachate contains constituents dissolved by the water as it percolates through the material.

Regular training in contingency operations shall be provided to operators. All-weather access shall be maintained for service and emergency repair of all equipment. Other elements of the plan shall be specified by the Regional Board in responding to the City's application for revised Waste Discharge Requirements.

Close and Reclaim Ponds 1-4

Construction. Installation of an activated sludge treatment system at any of the three proposed locations would result in the replacement of the current secondary treatment process. Once the new activated sludge system is operational, the four existing aerated treatment ponds (Ponds 1-4) would be drained and the accumulated sludge would be removed and exported from the site. The four ponds would then either be left in place or demolished. If left in place, the pond levees would be leveled, the site would be graded to a finished elevation of between 268 and 272 feet msl, and drainage features would be constructed. Demolition of the ponds would include leveling the pond levees, filling the ponds with imported fill, grading, site leveling, and construction of drainage features. Neither option currently includes provision for removal of the clay lining the pond bottoms. The greatest potential risk of construction-phase impacts from reclaiming the four ponds would be from erosion during excavation of the sludge and debris, grading and soil stockpiling (should the City choose to fill the four ponds and not leave them empty and in place), and from the release of pollutants during construction equipment operation and maintenance.

The proximity of Ponds 1-4 to Sutter Creek would require particular attention to control of construction-phase runoff in order to prevent impacts to the creek from sediment and other constituents mobilized by uncontrolled runoff. Implementation of mitigation measure Hydrology-1 would reduce potential construction-phase impacts of closing and reclaiming Ponds 1-4 on runoff water quality to a less than significant level.

Operation. Closure and reclamation of Ponds 1-4 would have minimal impacts on post-construction runoff water quality if the pond sites are left vacant, as local rainfall on the vacant ponds would infiltrate laterally through the unlined sides to the water table. Water quality impacts from the vacant Ponds 1-4 would be less than significant.

The risk of water quality degradation from uncontrolled runoff could be significant if the four ponds are demolished and leveled, and insufficient measures are taken to control and treat post-construction runoff. Implementation of mitigation measure Hydrology-1 would reduce these potential water quality impacts to a less than significant level.

Pipelines between the Secondary and Tertiary WWTP Facilities

Construction. Two existing 12-inch diameter pipelines connect the City WWTP to the COWRP on the north side of Sutter Creek. One pipeline carries raw wastewater from the Castle Oaks development to the City WWTP for treatment. The other pipeline conveys ARSA secondary treated effluent directly to the City WWTP for percolation and evaporation, bypassing the tertiary plant. In the event that the City chooses to treat raw wastewater at the City WWTP by building an activated sludge treatment system, but does not also construct a new tertiary WWTP at the same site, then secondary treated effluent would need to be piped across Sutter Creek to the COWRP for tertiary treatment prior to re-use or disposal. Alternatively, if both construction of the activated sludge treatment system and expansion of the tertiary treatment plant occur at the COWRP, then raw municipal wastewater from the City of Ione would need to be piped across Sutter Creek to the COWRP facility for treatment prior to disposal through the percolation ponds at the City WWTP, application on the Castle Oaks Golf Course, or re-use at other locations. Both options currently assume construction of two new pipelines connecting the City WWTP and the COWRP facilities. However, it may be possible to substitute one of the existing 12-inch ARSA wastewater pipelines for one of the new pipelines if its capacity is shown to be sufficient to handle the proposed flows.

As currently proposed, the pipelines connecting the secondary and tertiary treatment plants would follow the same rights of way as the two existing pipelines between the plants: along West Marlette Street and Five Mile Drive, crossing over Sutter Creek attached to the underside of the Old Stockton Road/Five Mile Drive Bridge. Sutter Creek is the only drainage that would be crossed by the proposed pipeline route. Construction of the pipelines between the secondary and tertiary WWTP facilities could adversely impact downstream water quality and beneficial uses through three major pathways, including erosion from project lands during construction, release of pollutants from equipment operation and maintenance during or following construction, and discharge of dewatering effluent during construction.

The pipelines would generally be constructed in trenches along existing roads or driveways and would involve some heavy equipment, excavation, soil stockpiling, and grading. Active percolation pond operation in the vicinity may result in locally elevated groundwater levels along the proposed pipeline alignment, even though construction would take place during the dry season. Dewatering of the trenches would be necessary in this case.

The proximity of the proposed pipeline routes to Sutter Creek would require particular attention to construction-phase measures to prevent spills, oversprays, and other potential impacts to water quality that are likely when working on the bridge directly over Sutter Creek. Implementation of mitigation measure Hydrology-1 would reduce potential construction-phase impacts of constructing the pipelines between the secondary and tertiary WWTP facilities on runoff water quality to a less than significant level.

If dewatering trenches is necessary for construction of the pipelines, discharges must comply with RWQCB Order No. R5-2003-008 (General Low Threat Discharge Permit). Disposal through surface infiltration is the most common acceptable practice. If the quality of dewatering effluent is questionable, Form 200 (Report of Waste Discharge) would need to be filed to initiate review by the Regional Board. The RWQCB would then review the list of constituents, their concentrations, proposed treatment processes, and disposal methods in conditioning the discharges and approving the Waste Discharge Order permitting dewatering effluent disposal. Alternatively, the effluent may be directed to the adjacent secondary or tertiary WWTP facilities.

The pipelines would cross Sutter Creek by being secured to the underside of the existing Old Stockton Road/Five Mile Drive Bridge. Per the Rivers and Harbors Act of 1899, the project would require authorization by the ACOE before construction of any structure in, under, or over navigable waters would be permitted. In addition, if pipeline construction would result in excavation within the riparian zone of Sutter Creek, the project could require a Section 1601 permit from the California Department of Fish and Game. Impacts from the construction of these pipelines would be less than significant with implementation of mitigation measure Hydrology-1 and adherence to the applicable regulations.

Operation. During operation, the new pipelines could leak, resulting in the discharge of secondary or tertiary treated effluent to groundwater (within the pipeline trenches) or surface water (where it crosses Sutter Creek), adversely affecting beneficial uses of the downstream waters. Per the California Department of Health Services (DHS) Title 22, Article 4 Code of Regulations, undisinfected secondary effluent of the type currently produced by the City WWTP is not suitable for discharge to streams. Permitted uses include: irrigation of orchards and vineyards, where the applied water does not contact fruit; ornamental trees, nursery stock, and sod farms; fodder, fiber, and seed crops not consumed by humans; and food crops treated to destroy pathogens prior to human consumption. Even disinfected tertiary effluent meeting Title 22 water quality requirements for unrestricted use, defined by DHS as all uses except for potable supply, is of potential concern due to toxicity to aquatic species. Nutrients, such as nitrate-nitrogen, in the secondary and tertiary effluent could also potentially indirectly degrade aquatic habitat quality by promoting eutrophication (nutrient enrichment), algal growth, and decreased dissolved oxygen levels.

Preventing water quality impacts due to pipeline leakage requires identification of leaks at the earliest opportunity. Areas of saturated soils could indicate a leak within the portion of the pipeline that is underground and should be investigated. Mitigation measure Hydrology-3 would require that the project applicant develop and implement a monitoring program that focuses on regular observations of the pipeline alignment, and would reduce potential impacts to a less than significant level. If excavation is necessary to investigate suspected leaks, best management practices (BMPs) similar to those identified in the project SWPPP would be implemented to prevent erosion and/or release of chemicals used in pipeline repairs.

Mitigation Measure Hydrology-3: The Applicant shall include a pipeline monitoring program in the application to the Regional Board for revision of the existing Waste Discharge Requirement (WDR) or issuance of a new WDR to accommodate an expanded effluent treatment and re-use program. The monitoring program shall include a schedule for regularly inspecting the pipeline alignment over Sutter Creek to confirm that leakage is absent. Results and observations shall be incorporated into the City's quarterly and annual monitoring reports for submittal to the Regional Board. Pipeline leaks along the bridge over Sutter Creek shall be immediately contained and repaired, to the extent feasible. If excavation is necessary to investigate suspected leaks, best management practices (BMPs) similar to those identified in the project SWPPP shall be implemented to prevent erosion and/or release of chemicals used in pipeline repairs.

Tertiary WWTP Expansion

Construction. Activities associated with construction of either a new or expanded tertiary treatment facility would not interfere with local drainage because neither the secondary WWTP nor the COWRP sites are subject to run-on, and no streams or drainages cross either facility. It should be noted that the southern margin of the COWRP is located within the 100-year floodplain and subject to flooding from extreme events. The portion of the site where the tertiary plant would be built is on the north side of the property, at or near the existing tertiary treatment plant, which is outside of the 100-year floodplain.

The two options for expanding the tertiary treatment of wastewater include constructing a new tertiary treatment facility at the secondary WWTP, adjacent to the new activated sludge system, or constructing an expansion of the existing tertiary treatment facility at the COWRP, doubling the size of the existing facility. Both options would involve significant excavation and grading, and the construction of additional treatment equipment, buildings, and pipelines. The greatest potential risk of construction-phase impacts on water quality would be from erosion during excavation, soil stockpiling, and grading, and from release of pollutants during construction equipment operation and maintenance. Mobilization of soil and/or chemical pollutants in runoff during the construction phase could impact downstream water quality and beneficial uses. Implementation of mitigation measure Hydrology-1 would reduce potential construction-phase impacts of tertiary plant construction on runoff water quality to a less than significant level.

Operation. A new tertiary plant built adjacent to the new activated sludge system would result in an increase in the acreage of impermeable surfaces on the site, and control of post-construction runoff would be necessary to avoid potential impacts due to degraded runoff water quality. Implementation of mitigation measure Hydrology-1 would reduce potential impacts of tertiary plant operation on runoff water quality to a less than significant level.

An expanded tertiary plant built at the COWRP site would not result in an increase in impervious surfaces, as the site is already paved. Operation of an expanded tertiary WWTP at this site would not result in an increase in post-construction runoff.

Whether a new tertiary plant is constructed adjacent to the new activated sludge system, or an expanded tertiary plant is constructed at the existing COWRP, the City's wastewater would be treated to tertiary standards, including filtration and chemical, ozone or ultraviolet light disinfection, and suitable for unrestricted use. Potential impacts of tertiary effluent constituents, which include nutrients and CECs, and could potentially include chlorine or chloramines.

The specific tertiary treatment disinfection process to be used has not yet been identified. Candidate processes include addition of chlorine or chloramines, radiation with ultraviolet (UV) light, or treatment with ozone. Disinfection with chlorine, the conventional method of wastewater disinfection, is the process currently used at the COWRP. Chlorine can react with organic compounds in the wastewater to produce toxic disinfection byproducts (e.g., trihalomethanes, haloacetic acids). In addition, if the treated effluent is not dechlorinated (through addition of sodium bisulfite) prior to discharge, residual levels of chlorine in the treated wastewater can cause aquatic toxicity if sizeable accidental discharges from pipelines enter waterways. Disinfection with chloramine is increasingly being substituted for chlorine as chloramine is more stable, has a longer half-life in the distribution system, and produces lower levels of disinfection byproducts. However, chloramine is also extremely toxic to fish and aquatic life.

Disinfection using either UV light or ozone would be equally effective as chlorine or chloramines in removing pathogens. Although both processes can be more costly than conventional disinfection, they produce no disinfection byproducts and the resulting treated effluent has no aquatic toxicity issues. Each of these processes is widely used to for disinfection of wastewater and no significant hydrologic impacts are anticipated.

With regard to the potential removal of Constituents of Emerging Concern (CECs), such as pharmaceuticals and personal care products (PPCPs), the fact that UV light is less effective than chlorine, chloramine or ozone oxidation at removing some PPCPs, such as steroid hormones, must be balanced against reduced production of disinfection byproducts. Reverse osmosis and activated carbon filtration are considered the most effective, albeit typically the most expensive, means to reduce PPCP concentrations in wastewater. At present, there are no federal regulations specific to pharmaceuticals in drinking or natural waters, and concentrations of PPCPs and EDCs in wastewater are typically not monitored. The most applicable state regulation is the Regional Board's Basin Plan narrative water quality objective for toxicity (see Table 3.1-4), which states that all waters should be free of substances that produce detrimental effects in living organisms.

Regional Board staff would be required to evaluate the proposed wastewater treatment plant modifications, operations, and management, including irrigation with treated effluent and other proposed recycled water uses such as mining operations, as part of project permitting. The existing comprehensive waste discharge requirements (WDR), which already include control measures for surface and groundwater quality protection that minimize exposure to PPCPs in treated wastewater, would be revised and conditioned based upon staff's evaluation of potential water quality impacts associated with use as proposed, if approval of the project is granted.

Part II – Disposal

Pond 8

Construction. The site of the secondary WWTP is not subject to run-on, and no streams or drainages cross the facility; therefore, activities associated with construction of Pond 8 would not interfere with local drainage patterns. The new pond would be built at the secondary WWTP south of Sutter Creek, and sited south of existing treatment Ponds 1 to 4 and west of existing disposal Pond 7. Pond 8 construction would require destruction of the westernmost of the two existing stormwater retention basins.

Pond construction would involve significant excavation and grading. The pond would not be clay-lined, as effluent to be percolated and evaporated would have received tertiary treatment and thus would not require additional filtration through a clay liner. The greatest potential risk of construction-phase impacts from construction of Pond 8 would be from erosion during excavation, soil stockpiling, and grading, and from release of pollutants during construction equipment operation and maintenance. Mobilization of soil and/or chemical pollutants in runoff during the construction phase could impact downstream water quality and beneficial uses. Implementation of mitigation measure Hydrology-1 would reduce potential impacts of Pond 8 construction on runoff water quality to a less than significant level.

Operation. Pond 8 would be connected to existing disposal Ponds 5-7 by an existing pipeline, installed in 2001 when construction of Pond 8 was first anticipated. Operation of Pond 8 would be similar to that of the other three disposal ponds, and would increase the disposal capacity at the secondary WWTP from 0.6 MGD to 0.9 MGD. Pond 8 would be used for disposal of tertiary treated wastewater, which would be filtered, disinfected tertiary wastewater suitable for unrestricted use, and no potential impacts on groundwater quality from effluent disposal through a new Pond 8 are anticipated.

By increasing the volume of effluent percolated to groundwater by 33 percent, operation of Pond 8 would increase the potential for seepage of groundwater from the area of the City WWTP to Sutter Creek, a potential violation of the WDR. However, the volume of existing seepage from the south bank bordering the City WWTP is already very low, seasonally restricted, and comprises a mixture of treated effluent and ambient groundwater in unknown proportions. Lining or filling disposal Ponds 5 and 6, as proposed by the City (and discussed above), would reduce existing seepage volumes further. Pond 8 would be constructed on the southern portion of the site, more than 200 feet away from the creek, in an area where all or almost all groundwater flows to the west and southwest, parallel to or away from the creek. In addition, the increased distance from the Creek would further enhance renovation of percolating effluent and also provide for greater mixing with ambient groundwater prior to any seepage entering Sutter Creek. Thus, potential impacts of the operations of Pond 8 on seepage to Sutter Creek and violation of the WDR prohibition on discharges of treated effluent to surface waters would be below the level of significance.

Disposal Option 1 – Disposal to Pond 9

Construction. Pond 9 would be constructed in the vacant field to the west of the existing tertiary treatment plant and north of Sutter Creek. The Pond 9 site is not subject to run-on, and no streams or drainages cross the site. Pond 9 would be constructed outside of the 100-year floodplain for Sutter Creek.

For disposal option 1, Pond 9 would be constructed using similar methods as for Pond 8, and would also not be clay-lined, as the effluent to be percolated and evaporated would have received tertiary treatment and therefore would not require additional filtration through a clay liner. The greatest potential risk of construction-phase impacts from construction of Pond 9 would be from erosion during excavation, soil stockpiling, and grading, and from the release of pollutants during construction equipment operation and maintenance. Mobilization of soil and/or chemical pollutants in runoff during the construction phase could impact downstream water quality and beneficial uses. Implementation of mitigation measure Hydrology-1 would likely reduce potential impacts of Pond 9 construction on runoff water quality to a less than significant level. However, if the City chooses to pursue disposal option 1, further CEQA analysis would be required at the project level to determine the water quality impacts of the construction of Pond 9, and to determine if additional mitigation measures would be necessary.

Operation. Pond 9 would be the only disposal pond currently considered for construction on the north side of Sutter Creek. The preliminary design proposes a maximum pond depth of 10 feet, including 2 feet of freeboard, and the pond would be sited more than 200 feet away from the creek. The pond would receive tertiary treated wastewater directly from the adjacent tertiary treatment plant. A preliminary geotechnical investigation would be required as part of the RWQCB permitting process for the new pond in order to confirm the suitability of the proposed location, and the design of the pond would need to take into account the effects of existing groundwater levels and sandy soils on disposal capacity and potential seepage of treated effluent into Sutter Creek. No water quality impacts are anticipated from percolation and evaporation of tertiary treated wastewater at Pond 9. However, if the City chooses to pursue disposal option 1, further CEQA analysis would be required at the project level to determine the water quality impacts of the operation of Pond 9.

Disposal Option 2- Disposal to Charles Howard Park and/or Unimin Mine

Construction. Disposal of tertiary treated wastewater at Charles Howard Park and/or Unimin Mine would require the construction of new pipelines. The six potential pipeline alignments range in length from approximately 19,000 to 23,750 feet. The pipelines would likely be constructed in trenches, most of which would follow existing roads and driveways. Some of the potential pipeline routes involve crossings at drainage ditches, particularly those along Old Stockton Road.

Construction of a pipeline to convey tertiary treated wastewater to Charles Howard Park and/or Unimin Mine could cause minor, temporary alterations in flows in local agricultural supply or drainage ditches at pipeline crossings, requiring temporary diversion of surface water to avoid mobilization of sediment into surface waters. As described in mitigation measure Hydrology-4 below, the applicant would be required to design and implement conventional methods to isolate the excavation work area, then dam, divert, and bypass the water until the section of pipeline crossing is completed and flow can be returned to the ditch. Implementation of mitigation measure Hydrology-4 would likely reduce potential construction-phase impacts of pipeline crossings on surface water quality to a less than significant level.

Potential water quality impacts from pipeline construction would likely be similar to those impacts described above for the pipeline construction between the secondary WWTP and the tertiary WWTP. Implementation of mitigation measure Hydrology-1 would likely reduce construction erosion impacts and impacts from the release of pollutants from equipment operation and maintenance to a less than significant level. In addition, should trenches need to be dewatered, risks of water quality impacts could likely be avoided through compliance with RWQCB Order No. R5-2003-008 (General Low Threat Discharge Permit). Further CEQA analysis would be required at the project level to determine the water quality impacts of the construction of pipelines connecting the tertiary WWTP to Charles Howard Park and/or Unimin Mine. Mitigation Measure Hydrology-4 would likely reduce the potential impacts of excavation across ditches where water is actively flowing to below the level of significance.

Mitigation Measure Hydrology-4: Where the treated effluent pipeline must cross a ditch or drainage containing flowing water at the time of excavation, the following procedures shall be used to avoid erosion and sediment contributions to surface water and maintain the integrity of the pipeline trench while work proceeds:

- The excavation work area shall be isolated using conventional methods, such as by placing coffer dams on either side of the ditch, or by using trench spoils from the excavation or imported soil to temporarily dam the flow of water through the drainage; and
- Water flowing in the ditch shall not be permitted to enter the excavation work area. Depending upon the rate and volume of flow in the ditch, suitable control methods might include: allowing the water to pond upstream until the pipeline work is completed; using a pump, siphon, or other means to redirect water to the receiving side of the

percolation. The two ponds combined presently cover a surface area of approximately 9.1 acres, and have a combined bottom area of 7.6 acres. Partially filling the ponds would reduce their combined surface area by 21 percent to 7.2 acres, and their combined bottom area by 21 percent to 6.0 acres. Assuming a proportional 21 percent reduction in disposal capacity for Ponds 5 and 6 due to these modifications, total annual disposal capacity (evaporation and percolation) of the existing four pond system (Pond 4 is dual-use) would decrease from about 310 MG a year to 280 MG a year, a 10 percent reduction in disposal capacity. A reduction of this magnitude in the volume of effluent percolated annually, if maintained, and if no additional disposal ponds were constructed, would slightly reduce groundwater levels in the area of the City WWTP, which would be a benefit as the facility currently experiences mounding of groundwater beneath the plant and a seasonally-elevated water table that intrudes into the 10-foot separation zone recommended by the Regional Board. Thus lining or filling Ponds 5 and 6 would have no detrimental impact on groundwater levels.

A 10 percent loss of disposal capacity due to lining or partially filling Ponds 5 and 6 could also impact wastewater disposal operations. The City WWTP is currently treatment-limited, with an effective treatment capacity of about 200 MG annually (0.55 MGD), as compared to an effective annual disposal capacity of about 310 MG (0.85 MGD). Current effluent inflows from Ione domestic sources and AWA filter backwash water total about 150 MG annually. Treated wastewater from the ARSA pipeline (including contributions from Sutter Creek and the Mule Creek State Prison) not routed to the COWRP plant for treatment and disposal on the Castle Oaks golf course might total as much as 75 MG annually. The resulting 225 MG total volume of treated wastewater currently requiring disposal through the City WWTP disposal ponds annually is approximately 20 percent less than the estimated 280 MG annual disposal capacity of the four ponds following modification of Ponds 5 and 6. Thus, partially filling or lining Ponds 5 and 6 would have no impact on wastewater treatment plant operations until influent flows increased appreciably due to population growth.

Activated Sludge System

Construction and operation of the activated sludge treatment system at any of the three potential locations and in either configuration (aboveground or belowground) would not cause a significant reduction in local groundwater levels. Some amount of groundwater pumping would be required at any of the three locations and with either the aboveground or underground options in order to dewater any excavated areas, but this groundwater pumping would be temporary in nature. Any groundwater pumped during construction activities would be deposited in the existing percolations ponds and returned to the groundwater aquifer.

The footprint of the new activated sludge system would be at least partially offset by the demolition of the existing secondary treatment facilities on the site. The net new impermeable area created by the construction and operation of an activated sludge system would be more than balanced by the greater volume of treated wastewater disposal that would occur in the nearby percolation ponds. Construction and operation of the activated sludge treatment system would have a less than significant impact on groundwater, and no mitigation is required.

Close and Reclaim Ponds 1-4

Closure and reclamation of treatment Ponds 1-4 at the City WWTP would not cause a reduction in local groundwater levels. Ponds 1-3 are lined treatment ponds that are essentially impermeable, and the sludge accumulation in Pond 4 reduces its potential percolation capacity by as much as 40 to 50 percent. Even if Ponds 1-4 are emptied and left in place, the removal of the sludge from Pond 4 would increase the amount of permeable surface in the area. The demolition, fill, and grading of these four ponds would further increase the amount of permeable surface in the area. The loss of groundwater recharge from the cessation of percolation activities at Pond 4 would be drainage; or with the coordination of the landowner or landowner's responsible party, temporarily discharging the water to adjacent lands in a non-erosive manner.

Operation. Disposal of tertiary treated wastewater at Charles Howard Park and/or Unimin Mine poses a risk of potential water quality impacts due to pipeline leakage and/or percolation of treated wastewater in areas where no groundwater quality or groundwater elevation data were evaluated for this EIR. The City of Ione's wastewater is currently treated to secondary treatment standards and effluent quality is further improved during percolation through the pond bottoms and passage to the groundwater table. . Regular water quality monitoring at locations upgradient and downgradient from the City WWTP and the treated effluent application site on the Castle Oaks Golf Course has not reflected impacts due to inadequate wastewater treatment. Background groundwater quality at locations farther east in the valley, in the area of Charles Howard Park, has yet to be established. Similarly, establishing suitable background groundwater quality for comparison at the Unimin Mine site would depend on the location(s) of use. It is therefore conservative to assume that leakage or percolation of tertiary treated wastewater could potentially impact groundwater quality at these locations due to nutrients (nitrate and ammonia nitrogen), disinfection byproducts (chlorine, chloramine), and salts present in the treated wastewater. These potential impacts would be evaluated in site-specific CEQA evaluation assessments, and impacts and mitigation would be determined at that time.

With regard to the option to dispose of tertiary treated wastewater at Charles Howard Park, the State Board has recently adopted a Recycled Water Policy (SWRCB Resolution No. 2009-0011) and recently released for public comment a new draft General Permit for Landscape Irrigation Uses of Municipal Recycled Water. In accordance with the provisions of the Recycled Water Policy, a CEC Advisory Panel has been established and convened for the first time on May 4, 2009 to address questions about regulating CECs with respect to the use of recycled water. The panel will provide recommendations to the State Water Board and California Department of Public Health. The State of California is currently reviewing the scientific literature and expects to recommend actions to protect public health and the environment in the year 2011.

At this time, it appears that use at the Unimin Mine is conditional on termination of the mine's existing relationship with their raw water supplier, Amador Water Agency. If proposed, substitution of reclaimed effluent for the current supply may cause the Regional Board to revise the mine's existing NPDES permit for mining operations.

Disposal Option 3 – Other Potential Disposal Options

Construction. Disposal option 3 includes such options as constructing additional percolation ponds and/or the construction of pipelines to other potential end users of tertiary treated wastewater. Potential impacts on drainage patterns and runoff water quality during construction of these options would likely be similar to those described above for Ponds 8 and 9 and/or for the proposed pipelines to Charles Howard Park and/or Unimin Mine. Similar mitigation measures would likely apply in order to minimize water quality impacts during construction. Further CEQA analysis would be required at the project level to determine the water quality impacts at the time any additional disposal options require further evaluation.

Operation. At present, no additional locations for percolation ponds or potential users of treated effluent have been identified. However, potential water quality impacts from the use of tertiary treated wastewater would likely be similar to those described above for the operation of Ponds 8 and 9 and for the expansion of tertiary treated wastewater use to Charles Howard Park and/or Unimin Mine, and similar mitigation measures would likely apply. The City would need to apply to the Regional Board for permission to serve additional disposal sites. Regional Board staff would then evaluate the application based on the type of use proposed, the suitability of the location, and any site-specific or project-specific concerns. If approved, the Regional Board would then modify and condition the City's existing WDR to avoid potential water quality impacts from the new proposed uses. Further CEQA analysis would be required at the project level to determine the water quality impacts of the operation of these additional disposal options.

Part III – Storage

Construction. Use of Preston Reservoir, Ione Water Reservoir, or another reservoir for storage of tertiary treated wastewater would require the construction of a new pipeline to transfer the water. No route for any such pipelines has been proposed at this time, nor has the use of a storage reservoir been proposed; therefore, specific impacts cannot be identified at this stage of project development.

Potential impacts on local drainage patterns would depend on whether or not the proposed pipeline route crossed drainages or other waterways. If so, temporary diversion of surface water would be necessary and the applicant should consider conventional methods to isolate the excavation work area, then dam, divert and bypass the agricultural water until the section of pipeline crossing is completed and flow can be returned to the ditch. The potential impact on drainage patterns would likely be temporary and localized, similar to those discussed above for pipelines conveying treated effluent to Charles Howard Park and/or Unimin Mine. Implementation of mitigation measure Hydrology-4 would likely reduce potential construction-phase impacts of pipeline crossings on surface water quality to a less than significant level.

Potential impacts on runoff water quality during pipeline construction would likely be similar to those described above for other proposed pipelines, and related control measures would likely apply. Implementation of mitigation measure Hydrology-1 would likely reduce potential construction-phase impacts of pipeline construction on runoff water quality to a less than significant level. Should trenches need to be dewatered, risks of water quality impacts could be avoided through compliance with RWQCB Order No. R5-2003-008 (General Low Threat Discharge Permit). Further CEQA analysis would be required at the project level to determine the water quality impacts of the construction of pipelines to an existing or future storage reservoir.

Operation. Potential impacts due to leakage of new pipelines or pipeline segments needed to convey tertiary treated wastewater would likely be similar to those described above for pipelines to Charles Howard Park and/or Unimin Mine, and the similar mitigation measures would likely apply.

Water quality impacts are anticipated to be unlikely from the storage of tertiary treated wastewater. Tertiary treated wastewater would be of a quality deemed acceptable by the state for unrestricted use, including storage in non-restricted recreational use impoundments; therefore, addition of tertiary treated wastewater to a reservoir would be unlikely to degrade water quality, and could actually improve reservoir water quality and reduce potential impacts from subsequent use. Further CEQA analysis would be required at the project level to determine the water quality impacts of the storage of tertiary treated wastewater at an existing or future storage reservoir.

Potential Impact 3.1-2: The potential to substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).

Existing Infrastructure

Pond 7

Construction. The creation of new impervious surfaces can lead to a lowering of the groundwater table as rainfall that previously recharged through permeable soils is converted to runoff.

Construction of new disposal Pond 7 would have reduced recharge only if the pond was built during the rainy season, however, and the impact would have been temporary and less than significant. Pond 7 was originally constructed in September 2001, and then reconstructed in September 2006, both of which were periods when no rain was falling. Therefore, there was no impact related to substantially depleting groundwater supplies or interfering with groundwater recharge during construction of Pond 7.

Operation. Operation of Pond 7 does not decrease recharge, as natural rainfall on the pond continues to recharge the aquifer through the pond bottom during the wet season. The additional groundwater recharge supplied by the disposal of secondary treated wastewater increases, rather than decreases, local water supplies south of Sutter Creek. Potential impacts on water quality of increased recharge and higher groundwater levels due to operation of Pond 7 are discussed under Impact 3.1-1, above. Impacts on groundwater depletion or recharge from the operation of Pond 7 are less than significant.

The addition of Pond 7 increased the annual disposal capacity of the City WWTP by about 102 MG per year (about 0.3 MGD) from approximately 210 MG a year to 312 MG a year, a 33 percent increase in disposal capacity. Mounding of groundwater likely pre-dates operation of Pond 7, but disposal of up to 0.3 MGD of additional effluent probably raised water levels beneath portions of the City WWTP as much as 2 feet, and increased the frequency and magnitude of the water table rise into the 10-foot deep zone of separation between the base of the ponds and the groundwater table recommended in Appendix 36 (Guidelines for Waste Disposal from Land Developments) of the Central Valley Regional Board's Basin Plan (RWQCB, 1995).

The bottom of Pond 7 is at elevation 262 feet amsl, while water levels in the monitoring wells and piezometers bordering the City WWTP remained above 253 feet amsl, and often within 5 feet of the bottom of Pond 7, from 2002 to 2008. Water levels probably also rose slightly at locations south and west of the facility where high groundwater is already reported at certain times of year, but in the absence of prior groundwater data from these areas it is not possible to estimate the magnitude or duration of the higher groundwater levels. As operation of Pond 7 has not been associated with any impacts to water quality, and the effects on groundwater levels downgradient from the plant have not been conclusively assessed but appear to be relatively minor, operation of Pond 7 has had a less than significant impact on groundwater levels.

Part I – Treatment

Line or Partially Fill Ponds 5 and 6

Construction. Partially filling or lining those portions of Ponds 5 and 6 at the northern end of the City WWTP that are within 200 feet of Sutter Creek would permanently reduce the City's existing capacity for both effluent storage and effluent disposal. Lining the same portions of the two ponds would maintain the existing storage capacity, but reduce the acreage of pond bottom available for percolation similar to the effects of pond-filling. If pond modification or filling occurred during the dry season, as is likely, then there would be no impact on depletion of groundwater levels. If construction occurred during the wet season, impacts on recharge would be minor and temporary, being limited to the period of pond construction, which is estimated at 6 weeks or less. This temporary loss of recharge would be reduced by the proposed construction phasing, as only one pond would be modified at a time, with the other pond continuing to be used for disposal while work proceeded. Impacts would be less than significant and no mitigation would be required.

Operation .Partially filling those portions of Ponds 5 and 6 at the northern end of the City WWTP that are within 200 feet of Sutter Creek would permanently reduce the City's existing capacity for both effluent storage and effluent disposal. Lining the same portions of the two ponds would maintain the existing storage capacity, but reduce the acreage of pond bottom available for more than compensated for by the construction and operation of a new Pond 8. The closure and reclamation of Ponds 1-4 would have a less than significant impact on groundwater, and no mitigation is required.

Pipelines between the Secondary and Tertiary WWTP Facilities

Construction of pipelines between the secondary and tertiary WWTP facilities could briefly reduce local groundwater levels if dewatering of pipeline trenches is required for pipeline construction. Local groundwater depletion from trench dewatering is of most concern for potential impacts on nearby wetlands and riparian corridors strongly or partly dependant on shallow, perched groundwater tables. No such areas occur along the proposed pipeline alignments. This impact would be localized and temporary and would therefore be less than significant.

Tertiary WWTP Expansion

Construction and operation of a new tertiary treatment plant adjacent to the new activated sludge system would not cause a significant reduction in local groundwater levels, and the impermeable surface created by the footprint of the facility would be more than compensated for by the increased volume of tertiary treated wastewater being percolated in Ponds 5-8. Impacts to groundwater would be less than significant, and no mitigation would be required.

Construction and operation of an expanded tertiary treatment plant at the existing COWRP would have no impact on groundwater, as the site of construction is already entirely paved. No mitigation is required.

Part II – Disposal

Pond 8

Construction. As described above for construction of Pond 7, the creation of new impervious surfaces can lead to a lowering of the groundwater table as rainfall that previously recharged through permeable soils is converted to runoff. Construction of new disposal Pond 8 would reduce recharge only if the pond was built during the rainy season, and the impact on groundwater recharge and groundwater supplies would be temporary and less than significant. If Pond 8 was constructed during the dry season, then there would be no construction-phase impacts on groundwater recharge or supplies.

Operation. Pond 8 would be used for disposal of tertiary treated effluent, either from a new, on-site tertiary treatment plant, or conveyed from the COWRP through a pipeline to be constructed north of Sutter Creek. Operation of Pond 8 would be similar to that of disposal Ponds 5-7. Assuming no further use of Pond 4 for effluent disposal, the proposed modifications to reduce disposal capacity of Ponds 5 and 6 were implemented as currently planned, and that Pond 7 continued to be used for disposal, then addition of Pond 8 would increase the annual disposal capacity at the City's WWTP facility from 0.6 MGD to 0.9 MGD. Thus, operation of Pond 8 would have no impact on reduction of groundwater recharge and depletion of groundwater supplies. Rather, the amount of recharge would increase by about 33 percent (110 MG on an annual basis).

Based on the groundwater monitoring data (see Appendix D), disposal to Pond 8 would introduce a substantial additional volume of groundwater into a system already experiencing elevated groundwater tables. Groundwater currently mounds beneath the City WWTP site before flowing laterally to areas south and west of the plant. Water levels in the monitoring wells and piezometers bordering the City WWTP remained above 253 feet amsl from 2002 to 2008, while elevations of the bottom of the existing disposal ponds range from 262 to 265 feet amsl. Percolation of an additional 0.3 MGD at Pond 8 would raise groundwater levels further at the City WWTP and in surrounding areas. The magnitude of the increase would depend upon the specific location but could be as much as 2 feet of rise beneath the City WWTP site. The 10 feet of separation between the base of the ponds and the groundwater table as recommended in the Regional Board's Basin Plan is not presently met at all times for all ponds, and would be met less frequently with percolation of an additional 0.3 MGD after Pond 8 begins operating. Mitigation measure Hydrology-5 addresses risks of spillage or surfacing on-site due to percolation of treated effluent through Pond 8. In addition, while no significant downgradient water quality impacts have been identified from existing operations, it is possible that percolation of the additional 0.3 MGD to the underlying aquifer could cause degradation. Mitigation measure Hydrology-6 would require increased frequency of monitoring in the surrounding wells after Pond 8 is placed in operation, and prescribes additional actions should degradation be found.

Water levels may also rise slightly at locations where high groundwater is already reported at certain times of year, but in the absence of prior groundwater data from these areas it is not possible to estimate the magnitude or duration of the higher groundwater levels. Potentially significant off-site impacts may include more "wet ground problems" at homes and farmsteads, some loss of crop yield (offset perhaps by more pasture yield in areas that need additional water), and a reduction in the usefulness of drainage improvements along Old Stockton Road, as well as some of the east-west ditches. Mitigation measure Hydrology-7 would require annual use of false-color aerial photography to be interpreted by a qualified hydrologist for the first five years following construction of Pond 8, and prescribes additional actions should there be a significant increase in the areal extent of off-site ponded or saturated areas southwest of the City WWTP.

Operation of Pond 8 could have a significant impact on groundwater levels. Implementation of mitigation measures Hydrology-5 through Hydrology-7 would reduce these groundwater impacts to a less than significant level.

Mitigation Measure Hydrology-5: The banks of all disposal ponds including Pond 8 shall be designed to withstand the boils and other near-pond surfacing similar to that experienced after the initial construction of Pond 7.

Mitigation Measure Hydrology-6: Following construction of Pond 8, more frequent monitoring of the wells that have already been installed may be required to demonstrate effective removal of compounds of concern, potentially with an expanded suite of constituents. To address this need, monitoring wells near Pond 8 and east and south of Pond 7 (wells P1, MW-5A, -5B, -4A, -4, and -6) shall be monitored monthly for static water levels, and for (a) bacteria, (b) nitrate and ammonia, (c) dissolved iron and manganese, (d) redox potential, (e) specific conductance, (f) sodium, and (g) chloride. While Pond 8 is in use and for six months thereafter, water levels and specific conductance shall be monitored quarterly in offsite wells 08-1, 08-2b, 08-3, 08-4a and 08-4b to assess effects of Pond 8 on the direction of groundwater flow relative to the baseline developed in this report. If bacteria, ammonia, or nitrate-nitrogen levels in the off-site wells are found to approach or exceed the Maximum Contaminant Levels for domestic potable supply (CCR, Title 22), then use of Pond 8 shall be discontinued and the treated effluent formerly percolated through Pond 8 shall be conveyed to other off-site locations or end users for disposal.

Mitigation Measure Hydrology-7: Following construction of Pond 8, then one or both of the following mitigation measures shall be implemented:

Option A: False-color infrared photography at a scale of 1:15,000 or more detailed[7] shall be flown of the greater project area to document the extent of ponding and soil saturation in areas to the south and west of the City's WWTP facilities. Infrared

[7] A 1:6,000 scale is usually ideal for analyzing grassland hydrologic issues.

photography shall be flown annually in early May or approximately 20 days following a late (or the last) rainfall of the season exceeding 0.5 inches for the week. Results shall be compared by a qualified hydrologist with similar photographs from prior to Pond 8 construction. A memorandum shall be prepared each post-project year outlining areas with more or less moisture than before the additional pond was built, and recommending measures, such as conveyance of the treated effluent formerly percolated through Pond 8 to other off-site locations or end users, to mitigate significant changes. After five years, the photography program should be reassessed and may be discontinued.

Option B: The off-site wells installed in January 2009 (MW 08-01, MW 08-2A, MW-08-2B, MW 08-3) shall be monitored quarterly to document changes in water levels south of the City WWTP facility potentially related to effects of effluent disposal. Specific conductance shall be measured in the field on each monitoring visit and water samples shall be collected using conventional sampling protocols and submitted to a state-certified laboratory for analysis of total dissolved solids (TDS), nitrate- and ammonia-nitrogen, sodium and chloride concentrations. A qualified hydrologist shall prepare an annual report or memorandum relating the monitoring results to the source(s) of groundwater, including effluent disposal at the City WWTP, and measures to mitigate significant changes in groundwater levels from conditions before Pond 8 was constructed shall be recommended, if appropriate. After five years, the monitoring program shall be reassessed and may be discontinued if data has shown that Pond 8 has a less than significant effect on groundwater levels.

Disposal Option 1 – Disposal to Percolation Pond 9

Construction. As described above for construction of Ponds 7 and 8, the creation of new impervious surfaces can lead to a lowering of the groundwater table as rainfall that previously recharged through permeable soils is converted to runoff. Construction of new disposal Pond 9 would reduce recharge only if the pond was built during the rainy season, and the impact on groundwater recharge and groundwater supplies would likely be temporary and less than significant. If Pond 9 were constructed during the dry season, then there would likely be no construction-phase impacts on groundwater recharge or supplies. Future project-level CEQA analysis would also be required to evaluate the potential impacts on groundwater levels of constructing Pond 9, and additional mitigation could be defined at that time.

Operation. Pond 9 would be constructed on the north side of Sutter Creek and would receive tertiary treated wastewater directly from the adjacent tertiary treatment plant. Operation of Pond 9 would be similar to that of disposal Ponds 5 to 8, except that no liner would be installed, allowing treated effluent to percolate through the sides as well as the bottom of the pond. Pond 9 disposal capacity is estimated at 0.35 MGD. As this effluent would be recharging the aquifer, operation of Pond 9 would not reduce groundwater recharge, nor deplete groundwater supplies. Rather, the amount of recharge would increase.

The additional 0.35 MGD (about 130 MG on an annual basis) of tertiary effluent would be discharged to a 10- to 12-foot-deep pond constructed in the field to the west of the existing tertiary treatment plant. While there is only a limited monitoring record for the three remaining piezometers in that field, groundwater levels varied from 7 to 13 feet bgs between 2005 and 2007, except during the period immediately following the accidental discharge of wastewater, when groundwater levels were much higher. As currently designed, water levels in Pond 9 would be 10 to 12 feet above the bottom of the pond, and discharges of 0.35 MGD of effluent could raise groundwater levels as much as two feet beneath the pond. Thus, operation of Pond 9 would be unlikely to

- Ponds and recreational impoundments;
- Commercial and industrial uses; and
- Groundwater recharge.

In each of these cases, if effluent is substituted for existing potable or raw water supplies, then a mere change in the quality of water applied or used would be unlikely to interfere with groundwater recharge or cause a substantial depletion of groundwater. The only way in which treated effluent use could negatively impact groundwater levels would be through a reduction in the amount of recharge at one or both wastewater treatment plants due to conveyance and use of the water outside of the aquifer recharge area, which is an unlikely scenario. Diversion of tertiary treated wastewater to end users instead of disposal in the pond system would be a project benefit because a reduction in local groundwater levels at either facility would increase separation between seasonally-elevated water tables and the base of the ponds. Impacts would be less than significant and no mitigation would be required.

Part III – Storage

Conveying treated effluent to Preston Reservoir, Ione Water Reservoir, or another reservoir would require construction of additional pipelines, which could temporarily impact local groundwater levels if dewatering is required for pipeline construction. Local groundwater depletion from trench dewatering is of most concern for potential impacts on nearby wetlands and riparian corridors strongly or partly dependent on shallow, perched groundwater tables. The project could minimize impacts by bypassing sensitive wetland habitat areas where possible, by scheduling trench construction during the dry season, and by restoring the soil surface to the existing grade following trench construction. Additionally, where water quality is suitable, dewatering effluent would likely be infiltrated in areas adjacent to the pipeline trenches, providing for local replacement of most of the water removed.

Use of an existing or future reservoir for the storage of tertiary treated wastewater could also have local effects on groundwater levels. Further CEQA analysis would be required at the project level to determine the groundwater impacts of the storage of tertiary treated wastewater at an existing or future storage reservoir, and the construction of pipelines to one or more of these reservoirs.

Potential Impact 3.1-3: The potential to substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.

The construction proposed as part of the project-level elements would not intersect any streams or other drainage courses. Further, the construction sites are level and the acreage that would be disturbed is limited. However, as construction of the project-level elements would disturb more than 1 acre of land, the City would be required to develop both an ESCP and a SWPPP prior to commencing construction, as outlined in mitigation measure Hydrology-1. The BMPs required as part of the SWPPP would suffice to control the rate and volume of runoff and avoid flooding on- or off-site both during and after construction. Impacts would be less than significant with implementation of mitigation measure Hydrology-1, and no further mitigation would be required.

The construction of the program-level elements could potentially intersect drainage courses or alter drainage patterns, depending on the locations chosen for these elements. Further CEQA analysis would be required at the project level to determine the drainage pattern impacts of the program-level project elements.

Potential Impact 3.1-4: The potential to create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.

There are no formal stormwater drainage systems downstream from either the secondary WWTP on the south side of Sutter Creek, or the COWRP on the opposite bank. Runoff from the south side of the secondary WWTP sheet flows into two stormwater detention/retention basins at the far southern end of the property; otherwise, drainage from the two properties is dispersed. The treatment and disposal ponds at the secondary WWTP are designed and operated to maintain two feet of freeboard, as required by the WDR, which provides sufficient capacity for incidental rainfall on the ponds without risk of overtopping or spilling.

As described in Impact 3.1-3 above and in previous sections, project construction would have only a limited capacity to increase peak runoff rates and volumes. Potential impacts of each proposed project component on erosion and mobilization of pollutants, during both the construction and post-construction stages, have been thoroughly addressed under Impact 3.1-1 above, and where appropriate, suitable mitigation measures have been proposed. No further mitigation would be required.

Potential Impact 3.1-5: The potential to place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary of Flood Insurance Rate Map or other flood hazard delineation map, or place structures within a 100-year flood hazard area that would impede or redirect flood flows.

The only portion of the existing and proposed WWTP facilities that is located within a 100-year flood hazard area is the southern portion of the COWRP property that faces Sutter Creek (FEMA 2000). However, most of the COWRP property, including the entire existing tertiary treatment plant and the potential location of a possible expansion of this tertiary treatment plant, lies above the 100-year inundation level.

The potential for expanding the City's secondary WWTP facility toward the south, or the COWRP toward the north, is constrained by the presence of a designated floodplain. Building or other activities within these floodplain areas are governed by FEMA regulations. These regulations distinguish between the floodway – through which the main flow of water passes – and the floodway fringe – areas of shallow flow at the edge of the main channel. In Ione, the floodway is generally the incised channel of Sutter Creek, while the flood-prone valley-floor areas beyond the main channel generally fall within the floodway fringe, where changes in ground surface or building is commonly allowed with specific restrictions.

All of the project-level components proposed for construction would be located outside of the floodplain or floodway. Pipelines conveying wastewater between the facilities or to locations for wastewater disposal would be installed in trenches and level-graded to pre-disturbance elevations. Thus, implementation of the project as currently proposed would not impede or re-direct flood flows, and no mitigation would be required.

Potential Impact 3.1-6: The potential to expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

The project does not presently include construction of any above-ground impoundments or reservoirs. Ponds proposed for construction or modification would be excavated into the ground and surrounded by low berms, as is currently the case with the existing ponds. All structures currently planned for construction, other than pipelines, would be constructed at either the City WWTP or the COWRP. Both of these sites are located outside of the floodplain or floodway where achieve the10 feet of separation between the base of the ponds and the groundwater table as recommended in the Regional Board's Basin Plan.

If groundwater rose to above the bottom of the pond, the effluent storage volume and the disposal capacity of Pond 9 would be significantly reduced. These issues would be addressed through a preliminary geotechnical investigation, which would be required as part of the RWQCB permitting process for the new pond. Pond 9 would need to be designed based on an assessment of the suitability of the proposed location, particularly the effects of existing groundwater levels on disposal capacity, as well as effects of proposed operations on the local water table. Future project-level CEQA analysis would also be required to evaluate the potential water quality impacts of operating Pond 9, and additional mitigation could be defined at that time.

Disposal Option 2- Disposal to Charles Howard Park and Unimin Mine

Construction. Construction of the pipeline(s) to convey treated effluent to Charles Howard Park and/or Unimin Mine could temporarily impact local groundwater levels if dewatering of pipeline trenches is required. Local groundwater depletion from trench dewatering is of most concern for potential impacts on nearby wetlands and riparian corridors strongly or partly dependant on shallow, perched groundwater tables. The project could minimize impacts by bypassing sensitive wetland habitat areas where possible, by scheduling trench construction during the dry season, and restoring the soil surface to the existing grade following trench construction. Additionally, where water quality is suitable, dewatering effluent could likely be infiltrated in areas adjacent to the pipeline trenches, providing for local replacement of most of the water removed. Further CEQA analysis would be required at the project level to determine the groundwater impacts of the construction of one or more of these pipelines.

Operation. Treated effluent conveyed to Charles Howard Park and/or the Unimin Mine would not interfere with groundwater recharge or cause a depletion of groundwater.

Treated effluent irrigation at Charles Howard Park and process use at Unimin Mine would substitute for existing supplies of raw water currently provided to each site by AWA. The frequency and amounts of effluent applied to Park landscaping would likely be nearly identical to current use patterns. Substitution of treated effluent for raw water in process use at the Unimin Mine would likely be similar to current use patterns. No additional recharge would occur beyond existing levels and there would be no impacts on groundwater recharge or water levels. Further CEQA analysis would be required at the project level to determine the groundwater impacts of the operation of one or more of these pipelines.

Disposal Option 3 – Other Potential Disposal Options

Construction. Potential impacts on groundwater recharge from the construction of additional percolation ponds and/or the construction of pipelines to additional potential end users of tertiary treated wastewater would likely be similar to those impacts identified for the construction of Pond 8 and the pipelines between the secondary WWTP and the tertiary WWTP, and from the tertiary WWTP to Charles Howard Park and/or Unimin Mine. Similar mitigation measures would likely be employed to reduce construction impacts on groundwater. Further CEQA analysis would be required at the project level to determine the groundwater impacts of the construction associated with other disposal options.

Operation. Disinfected tertiary effluent is suitable for unrestricted use, including:

- Irrigation of all food, feed, and fiber crops, orchards, and pastures;
- Irrigation of all types of landscaping, such as schoolyards, playgrounds and parks, golf courses, and cemeteries;

floodwaters might be redirected by construction of structures. The effluent pipeline between the two wastewater treatment plants would cross Sutter Creek attached to the existing bridge, which is above flood elevation.

Pipelines conveying effluent to disposal sites would likely traverse the floodway or floodplain of Sutter Creek; however, all pipelines would be installed below ground with the soil surface graded to match pre-construction elevations, thereby preventing potential impacts on flood flows that could result in a significant risk of loss, injury, or death due to flooding.

The project explores at the program level use of the Preston Reservoir and/or the Ione Water Reservoir (or another reservoir) for storage of tertiary treated wastewater. Deliveries of treated wastewater to either location would depend on the availability of reservoir capacity and would be subject to negotiations with the state (for Preston Reservoir), the Amador Water Agency (for Ione Water Reservoir), or perhaps another agency for any as yet unknown reservoir. The dam at the Preston Reservoir, which has a storage capacity of 235 acre-feet, is under the jurisdiction of the California Division of Dam Safety (DDS), which regulates dams that hold more than 50 acre-feet of water. DDS regularly inspects the condition of dams under its charge and requires that repairs be made if conditions warrant; therefore, risk of loss, injury, or death due to flooding from the use of Preston Reservoir would likely be less than significant. However, any change in operation of the reservoir associated with its incorporation into the City's treated effluent re-use program would require a separate project-level CEQA analysis during which potential impacts due to flooding or other causes and suitable mitigation measures would be explored.

The total storage capacity of the Ione Water Reservoir is 27 acre-feet; therefore, inspection and maintenance of this impoundment is the responsibility of the Amador Water Agency. The volume of water stored in this reservoir, which is located east of the City of Ione, is too small to cause significant risk of loss, injury, or death due to flooding in the event that the dam failed or was breached.

The City could also choose to construct a new reservoir to increase effluent storage capacity. Construction of a new reservoir and associated pipelines could result in impacts to water quality similar to those described above for construction of new disposal ponds and effluent conveyance pipelines. These impacts could potentially be mitigated to a less than significant level through implementation of the same mitigation measures. It is unlikely that any new storage reservoir would result in impacts due to flooding; however, the siting, design, and operation of the reservoir would require a separate project-level CEQA analysis during which these and other potential impacts and suitable mitigation measures would be explored.

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2: MMRP

2.1 Overview

This chapter of the MMRP includes a table that facilitates the implementation of all of the mitigation measures presented in the Final EIR. Table 2.2-1 includes all mitigation measures identified in the Final EIR, and is divided into the following columns:

1) MM#	2) Mitigation Measure	3) Implementation Schedule	4) Implementing Action	5) Verification Schedule	6) Method of Verification	7) Monitoring Entity

1) Column 1 includes the mitigation measure number from the EIR for reference.
2) Column 2 includes the text of the mitigation measure to be implemented.
3) Column 3 includes the scheduled timing for implementation.
4) Column 4 includes the actions necessary for implementation.
5) Column 5 describes the schedule that implementation of the measure should be verified by the monitoring entity.
6) Column 6 describes how to monitor and report on implementation, such as field verification, review of plans, coordination with an agency, documentation of compliance, etc.
7) Column 7 lists the agencies and parties responsible for monitoring.

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2.2 MMRP Implementation, Verification, and Monitoring

Table 2.2-1: MMRP Table

1) MM#	2) Mitigation Measure	3) Implementation Schedule	4) Implementing Action	5) Verification Schedule	6) Method of Verification	7) Monitoring Entity
Hydrology and Water Quality						
Hydrology-1	The Applicant shall prepare and submit an Erosion and Sediment Control Plan (ESCP) for review and approval by the City of Ione prior to issuance of a grading permit for lining and/or filling ponds 5 and 6. The ESCP shall include the locations and descriptions of control measures (BMPs), such as straw bale barriers, straw mulching, straw wattles, silt fencing, and temporary sediment ponds to be used at the project site to control and manage erosion and sediment, control and treat runoff, and promote infiltration of runoff from new impervious surfaces. The Applicant shall also submit a Notice of Intent (NOI) to the State Water Resources Control Board for coverage under the NPDES Construction General Permit and prepare and submit a Storm Water Pollution Prevention Plan (SWPPP) for review and approval by the City of Ione prior to issuance of a grading permit. The SWPPP shall incorporate the ESCP and describe construction-phase housekeeping measures. The SWPPP shall also include descriptions and designs of the post-construction BMPs to be implemented. Where applicable (e.g., for bioswales or biofiltration features), BMPs shall be designed based on specific criteria from recognized BMP design guidance manuals.	The ESCP and SWPPP shall be prepared for the review and approval of the City of Ione prior to issuance of a grading permit. The NOI shall be submitted to the State Water Resources Control Board prior to issuance of a grading permit.	Prepare and submit the ESCP, SWPPP, and NOI.	Prior to issuance of a grading permit.	Review of the ESCP and SWPPP by the City of Ione, and receipt of the NOI by the State Water Resources Control Board.	City of Ione State Water Resources Control Board

Table 2.2-1 *(Continued)*: MMRP Table

1) MM#	2) Mitigation Measure	3) Implementation Schedule	4) Implementing Action	5) Verification Schedule	6) Method of Verification	7) Monitoring Entity
Hydrology-2	**Mitigation Measure Hydrology-2:** The Applicant shall prepare and submit an operations, maintenance, and monitoring (OMM) plan to the Regional Board as part of the application for expansion of wastewater treatment plant facilities. The OMM plan shall include measures for containment, control, and treatment of runoff or leachate from the activated sludge system treatment and storage areas. Examples of suitable control measures may include lining below-ground facilities, siting facilities over concrete pads, or constructing sumps or installing tanks to retain flows, as determined necessary. Suitable treatment facilities include measures such as draining or pumping the leachate into constructed treatment wetlands, or use of manufactured devices to filter pollutants prior to discharge. The plan shall provide for contingent routing of untreated wastewater in the event of equipment stoppages or upsets of the treatment ponds. Regular training in contingency operations shall be provided to operators. All-weather access shall be maintained for service and emergency repair of all equipment. Other elements of the plan shall be specified by the Regional Board in responding to the City's application for revised Waste Discharge Requirements.	Submit the OMM to the RWQCB prior to construction.	Prepare and submit the OMM.	Prior to construction.	Review of the OMM by the RWQCB.	RWQCB
Hydrology-3	**Mitigation Measure Hydrology-3:** The Applicant shall include a pipeline monitoring program in the application to the Regional Board for revision of the existing Waste Discharge Requirement (WDR) or issuance of a new WDR to accommodate an expanded effluent treatment and re-use program. The monitoring program shall include a schedule for regularly inspecting the pipeline alignment over Sutter Creek to confirm that leakage is absent. Results and observations shall be incorporated into the City's quarterly and annual monitoring	Submit a pipeline monitoring program to the RWQCB prior to obtaining a revised WDR or a new WDR for the project.	Prepare and submit the pipeline monitoring program.	Prior to obtaining a revised WDR or a new WDR.	Review of the pipeline monitoring program by the RWQCB.	RWQCB

Table 2.2-1 *(Continued)*: MMRP Table

1) MM#	2) Mitigation Measure	3) Implementation Schedule	4) Implementing Action	5) Verification Schedule	6) Method of Verification	7) Monitoring Entity
	reports for submittal to the Regional Board. Pipeline leaks along the bridge over Sutter Creek shall be immediately contained and repaired, to the extent feasible. If excavation is necessary to investigate suspected leaks, best management practices (BMPs) similar to those identified in the project SWPPP shall be implemented to prevent erosion and/or release of chemicals used in pipeline repairs.					
Hydrology-4	**Mitigation Measure Hydrology-4:** Where the treated effluent pipeline must cross a ditch or drainage containing flowing water at the time of excavation, the following procedures shall be used to avoid erosion and sediment contributions to surface water and maintain the integrity of the pipeline trench while work proceeds: • The excavation work area shall be isolated using conventional methods, such as by placing coffer dams on either side of the ditch, or by using trench spoils from the excavation or imported soil to temporarily dam the flow of water through the drainage; and • Water flowing in the ditch shall not be permitted to enter the excavation work area. Depending upon the rate and volume of flow in the ditch, suitable control methods might include: allowing the water to pond upstream until the pipeline work is completed; using a pump, siphon, or other means to redirect water to the receiving side of the drainage; or with the coordination of the landowner or landowner's responsible party, temporarily discharging the water to adjacent lands in a non-erosive manner.	Prior to and during pipeline construction activities.	Take erosion and sedimentation control actions whenever a pipeline must cross a ditch or drainage.	Prior to construction.	Verified by an independent monitor in the field.	City of Ione

Table 2.2-1 *(Continued)*: MMRP Table

1) MM#	2) Mitigation Measure	3) Implementation Schedule	4) Implementing Action	5) Verification Schedule	6) Method of Verification	7) Monitoring Entity
Hydrology-5	**Mitigation Measure Hydrology-5:** The banks of all disposal ponds including Pond 8 shall be designed to withstand the boils and other near-pond surfacing similar to that experienced after the initial construction of Pond 7.	Prior to construction activities on any ponds.	The engineering plans for all ponds shall be prepared by a licensed civil engineer.	Prior to construction.	Review of engineering plans by the City of Ione.	City of Ione
Hydrology-6	Following construction of Pond 8, more frequent monitoring of the wells that have already been installed may be required to demonstrate effective removal of compounds of concern, potentially with an expanded suite of constituents. To address this need, monitoring wells near Pond 8 and east and south of Pond 7 (wells P1, MW-5A, -5B, -4A, -4, and -6) shall be monitored monthly for static water levels, and for (a) bacteria, (b) nitrate and ammonia, (c) dissolved iron and manganese, (d) redox potential, (e) specific conductance, (f) sodium, and (g) chloride. While Pond 8 is in use and for six months thereafter, water levels and specific conductance shall be monitored quarterly in offsite wells 08-1, 08-2b, 08-3, 08-4a and 08-4b to assess effects of Pond 8 on the direction of groundwater flow relative to the baseline developed in this report. If bacteria, ammonia, or nitrate-nitrogen levels in the off-site wells are found to approach or exceed the Maximum Contaminant Levels for domestic potable supply (CCR, Title 22), as a result of operation of the wastewater treatment facilities, then use of Pond 8 shall be discontinued and the treated effluent formerly percolated through Pond 8 shall be conveyed to other off-site locations or end users for disposal. Prior to discontinuing use of Pond 8 in response to excess bacteria levels, a well disinfection plan will be implemented to confirm whether elevated bacteria is attributable to the wastewater treatment facility operations.	Following construction of Pond 8.	Monthly well monitoring for specified constituents, and quarterly monitoring for water levels and specific conductance. If specific MCLs are exceeded, then a well disinfection plan shall be implemented and use of Pond 8 shall cease if elevated bacteria is attributable to wastewater treatment facility operations.	Monthly and quarterly following construction of Pond 8.	Preparation of monthly and quarterly monitoring reports by the City of Ione.	City of Ione
Hydrology-7	**Mitigation Measure Hydrology-7:** Following	Following	Annual aerial	Annually	Annual aerial	City of Ione

Table 2.2-1 *(Continued)*: MMRP Table

1) MM#	2) Mitigation Measure	3) Implementation Schedule	4) Implementing Action	5) Verification Schedule	6) Method of Verification	7) Monitoring Entity
	construction of Pond 8, one or both of the following mitigation measures shall be implemented: Option A: False-color infrared photography at a scale of 1:15,000 or more detailed1 shall be flown of the greater project area to document the extent of ponding and soil saturation in areas to the south and west of the City's WWTP facilities. Infrared photography shall be flown annually in early May or approximately 20 days following a late (or the last) rainfall of the season exceeding 0.5 inches for the week. Results shall be compared by a qualified hydrologist with similar photographs from prior to Pond 8 construction. A memorandum shall be prepared each post-project year outlining areas with more or less moisture than before the additional pond was built, and recommending measures, such as conveyance of the treated effluent formerly percolated through Pond 8 to other off-site locations or end users, to mitigate significant changes. After five years, the photography program should be reassessed and may be discontinued. Option B: The off-site wells installed in January 2009 (MW 08-01, MW 08-2A, MW-08-2B, MW 08-3) shall be monitored quarterly to document changes in water levels south of the City WWTP facility potentially related to effects of effluent disposal. Specific conductance shall be measured in the field on each monitoring visit and water samples shall be collected using conventional sampling protocols and submitted to a state-certified laboratory for analysis of total dissolved solids (TDS), nitrate- and ammonia-nitrogen, sodium and chloride concentrations. A qualified hydrologist shall prepare an annual report or	construction of Pond 8.	infrared photography, to be analyzed by a qualified hydrologist and compared to similar photos from prior to Pond 8 construction. After 5 years, the photography program shall be reassessed and may be discontinued if data has shown that Pond 8 has a less than significant effect on groundwater levels. OR Quarterly well monitoring of water levels and specific conductance. After 5 years, the well monitoring program shall be reassessed and may be discontinued if data has shown that Pond 8 has a less than significant effect on groundwater levels.	following construction of Pond 8, for a minimum of 5 years.	photography, and an annual written memorandum prepared by a qualified hydrologist. OR Quarterly well monitoring, and an annual written memorandum prepared by a qualified hydrologist.	

[1] A 1:6,000 scale is usually ideal for analyzing grassland hydrologic issues.

Table 2.2-1 *(Continued)*: MMRP Table

1) MM#	2) Mitigation Measure	3) Implementation Schedule	4) Implementing Action	5) Verification Schedule	6) Method of Verification	7) Monitoring Entity
	memorandum relating the monitoring results to the source(s) of groundwater, including effluent disposal at the City WWTP, and measures to mitigate significant changes in groundwater levels from conditions before Pond 8 was constructed shall be recommended, if appropriate. After five years, the monitoring program shall be reassessed and may be discontinued if data has shown that Pond 8 has a less than significant effect on groundwater levels.					
Recommended Measure Hydrology-1	The City shall conduct quarterly monitoring of the seepage on the south bank of Sutter Creek within the vicinity of the secondary WWTP. This monitoring data shall be supplied to the RWQCB upon request. If the monitoring data indicate that the wastewater treatment plant operations are impacting Sutter Creek, then the City shall retain a qualified hydrogeologist to evaluate the impacts and identify appropriate measures to address such impacts.	Quarterly monitoring to be performed prior to, during, and following construction activities.	Quarterly monitoring of seepage on the south bank of Sutter Creek.	Quarterly seepage monitoring.	Monitoring data to be recorded and maintained by the City of Ione.	City of Ione, and RWQCB upon Board's request
Biological Resources						
Biology-1	**Biological Resources-1:** Qualified biologists shall locate and stake sensitive resources before construction activities begin, and construction fencing shall be installed to delineate those areas in the field. Monitors shall inspect all fenced areas immediately prior to construction to ensure that barrier fencing, stakes, flagging (i.e., native riparian with a dbh of 3 inches or greater), and required setback buffers are correct and maintained. Specific buffer zone distances shall be determined by the appropriate resource agencies (CDFG and USFWS). Surveys may be required to determine the presence of elderberry shrubs, obligate habitat for the federally threatened valley elderberry longhorn beetle. If any elderberry shrubs are documented outside already delineated	Prior to construction.	A qualified biologist shall locate and stake any sensitive resources, and oversee installation of construction fencing in the field to protect these resources.	Prior to construction.	Field monitoring by a qualified biologist.	City of Ione CDFG USFWS

APPENDIX G

*Ione WWTP Master Plan EIR
by RMT/MHA dated December 2009 -
Hydrology Mitigation Measures*

2: MMRP

2.1 Overview

This chapter of the MMRP includes a table that facilitates the implementation of all of the mitigation measures presented in the Final EIR. Table 2.2-1 includes all mitigation measures identified in the Final EIR, and is divided into the following columns:

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2.2 MMRP Implementation, Verification, and Monitoring

Table 2.2-1: MMRP Table

1) MM#	2) Mitigation Measure	3) Implementation Schedule	4) Implementing Action	5) Verification Schedule	6) Method of Verification	7) Monitoring Entity
Hydrology and Water Quality						
Hydrology-1	The Applicant shall prepare and submit an Erosion and Sediment Control Plan (ESCP) for review and approval by the City of Ione prior to issuance of a grading permit for lining and/or filling ponds 5 and 6. The ESCP shall include the locations and descriptions of control measures (BMPs), such as straw bale barriers, straw mulching, straw wattles, silt fencing, and temporary sediment ponds to be used at the project site to control and manage erosion and sediment, control and treat runoff, and promote infiltration of runoff from new impervious surfaces. The Applicant shall also submit a Notice of Intent (NOI) to the State Water Resources Control Board for coverage under the NPDES Construction General Permit and prepare and submit a Storm Water Pollution Prevention Plan (SWPPP) for review and approval by the City of Ione prior to issuance of a grading permit. The SWPPP shall incorporate the ESCP and describe construction-phase housekeeping measures. The SWPPP shall also include descriptions and designs of the post-construction BMPs to be implemented. Where applicable (e.g., for bioswales or biofiltration features), BMPs shall be designed based on specific criteria from recognized BMP design guidance manuals.	The ESCP and SWPPP shall be prepared for the review and approval of the City of Ione prior to issuance of a grading permit. The NOI shall be submitted to the State Water Resources Control Board prior to issuance of a grading permit.	Prepare and submit the ESCP, SWPPP, and NOI.	Prior to issuance of a grading permit.	Review of the ESCP and SWPPP by the City of Ione, and receipt of the NOI by the State Water Resources Control Board.	City of Ione State Water Resources Control Board

Table 2.2-1 *(Continued)*: MMRP Table

1) MM#	2) Mitigation Measure	3) Implementation Schedule	4) Implementing Action	5) Verification Schedule	6) Method of Verification	7) Monitoring Entity
Hydrology-2	**Mitigation Measure Hydrology-2:** The Applicant shall prepare and submit an operations, maintenance, and monitoring (OMM) plan to the Regional Board as part of the application for expansion of wastewater treatment plant facilities. The OMM plan shall include measures for containment, control, and treatment of runoff or leachate from the activated sludge system treatment and storage areas. Examples of suitable control measures may include lining below-ground facilities, siting facilities over concrete pads, or constructing sumps or installing tanks to retain flows, as determined necessary. Suitable treatment facilities include measures such as draining or pumping the leachate into constructed treatment wetlands, or use of manufactured devices to filter pollutants prior to discharge. The plan shall provide for contingent routing of untreated wastewater in the event of equipment stoppages or upsets of the treatment ponds. Regular training in contingency operations shall be provided to operators. All-weather access shall be maintained for service and emergency repair of all equipment. Other elements of the plan shall be specified by the Regional Board in responding to the City's application for revised Waste Discharge Requirements.	Submit the OMM to the RWQCB prior to construction.	Prepare and submit the OMM.	Prior to construction.	Review of the OMM by the RWQCB.	RWQCB
Hydrology-3	**Mitigation Measure Hydrology-3:** The Applicant shall include a pipeline monitoring program in the application to the Regional Board for revision of the existing Waste Discharge Requirement (WDR) or issuance of a new WDR to accommodate an expanded effluent treatment and re-use program. The monitoring program shall include a schedule for regularly inspecting the pipeline alignment over Sutter Creek to confirm that leakage is absent. Results and observations shall be incorporated into the City's quarterly and annual monitoring	Submit a pipeline monitoring program to the RWQCB prior to obtaining a revised WDR or a new WDR for the project.	Prepare and submit the pipeline monitoring program.	Prior to obtaining a revised WDR or a new WDR.	Review of the pipeline monitoring program by the RWQCB.	RWQCB

Table 2.2-1 *(Continued)*: MMRP Table

1) MM#	2) Mitigation Measure	3) Implementation Schedule	4) Implementing Action	5) Verification Schedule	6) Method of Verification	7) Monitoring Entity
	reports for submittal to the Regional Board. Pipeline leaks along the bridge over Sutter Creek shall be immediately contained and repaired, to the extent feasible. If excavation is necessary to investigate suspected leaks, best management practices (BMPs) similar to those identified in the project SWPPP shall be implemented to prevent erosion and/or release of chemicals used in pipeline repairs.					
Hydrology-4	**Mitigation Measure Hydrology-4:** Where the treated effluent pipeline must cross a ditch or drainage containing flowing water at the time of excavation, the following procedures shall be used to avoid erosion and sediment contributions to surface water and maintain the integrity of the pipeline trench while work proceeds: • The excavation work area shall be isolated using conventional methods, such as by placing coffer dams on either side of the ditch, or by using trench spoils from the excavation or imported soil to temporarily dam the flow of water through the drainage; and • Water flowing in the ditch shall not be permitted to enter the excavation work area. Depending upon the rate and volume of flow in the ditch, suitable control methods might include: allowing the water to pond upstream until the pipeline work is completed; using a pump, siphon, or other means to redirect water to the receiving side of the drainage; or with the coordination of the landowner or landowner's responsible party, temporarily discharging the water to adjacent lands in a non-erosive manner.	Prior to and during pipeline construction activities.	Take erosion and sedimentation control actions whenever a pipeline must cross a ditch or drainage.	Prior to construction.	Verified by an independent monitor in the field.	City of Ione

Table 2.2-1 *(Continued)*: MMRP Table

1) MM#	2) Mitigation Measure	3) Implementation Schedule	4) Implementing Action	5) Verification Schedule	6) Method of Verification	7) Monitoring Entity
Hydrology-5	**Mitigation Measure Hydrology-5:** The banks of all disposal ponds including Pond 8 shall be designed to withstand the boils and other near-pond surfacing similar to that experienced after the initial construction of Pond 7.	Prior to construction activities on any ponds.	The engineering plans for all ponds shall be prepared by a licensed civil engineer.	Prior to construction.	Review of engineering plans by the City of Ione.	City of Ione
Hydrology-6	Following construction of Pond 8, more frequent monitoring of the wells that have already been installed may be required to demonstrate effective removal of compounds of concern, potentially with an expanded suite of constituents. To address this need, monitoring wells near Pond 8 and east and south of Pond 7 (wells P1, MW-5A, -5B, -4A, -4, and -6) shall be monitored monthly for static water levels, and for (a) bacteria, (b) nitrate and ammonia, (c) dissolved iron and manganese, (d) redox potential, (e) specific conductance, (f) sodium, and (g) chloride. While Pond 8 is in use and for six months thereafter, water levels and specific conductance shall be monitored quarterly in offsite wells 08-1, 08-2b, 08-3, 08-4a and 08-4b to assess effects of Pond 8 on the direction of groundwater flow relative to the baseline developed in this report. If bacteria, ammonia, or nitrate-nitrogen levels in the off-site wells are found to approach or exceed the Maximum Contaminant Levels for domestic potable supply (CCR, Title 22), as a result of operation of the wastewater treatment facilities, then use of Pond 8 shall be discontinued and the treated effluent formerly percolated through Pond 8 shall be conveyed to other off-site locations or end users for disposal. Prior to discontinuing use of Pond 8 in response to excess bacteria levels, a well disinfection plan will be implemented to confirm whether elevated bacteria is attributable to the wastewater treatment facility operations.	Following construction of Pond 8.	Monthly well monitoring for specified constituents, and quarterly monitoring for water levels and specific conductance. If specific MCLs are exceeded, then a well disinfection plan shall be implemented and use of Pond 8 shall cease if elevated bacteria is attributable to wastewater treatment facility operations.	Monthly and quarterly following construction of Pond 8.	Preparation of monthly and quarterly monitoring reports by the City of Ione.	City of Ione
Hydrology-7	**Mitigation Measure Hydrology-7:** Following	Following	Annual aerial	Annually	Annual aerial	City of Ione

Table 2.2-1 *(Continued)*: MMRP Table

1) MM#	2) Mitigation Measure	3) Implementation Schedule	4) Implementing Action	5) Verification Schedule	6) Method of Verification	7) Monitoring Entity
	construction of Pond 8, one or both of the following mitigation measures shall be implemented: Option A: False-color infrared photography at a scale of 1:15,000 or more detailed1 shall be flown of the greater project area to document the extent of ponding and soil saturation in areas to the south and west of the City's WWTP facilities. Infrared photography shall be flown annually in early May or approximately 20 days following a late (or the last) rainfall of the season exceeding 0.5 inches for the week. Results shall be compared by a qualified hydrologist with similar photographs from prior to Pond 8 construction. A memorandum shall be prepared each post-project year outlining areas with more or less moisture than before the additional pond was built, and recommending measures, such as conveyance of the treated effluent formerly percolated through Pond 8 to other off-site locations or end users, to mitigate significant changes. After five years, the photography program should be reassessed and may be discontinued. Option B: The off-site wells installed in January 2009 (MW 08-01, MW 08-2A, MW-08-2B, MW 08-3) shall be monitored quarterly to document changes in water levels south of the City WWTP facility potentially related to effects of effluent disposal. Specific conductance shall be measured in the field on each monitoring visit and water samples shall be collected using conventional sampling protocols and submitted to a state-certified laboratory for analysis of total dissolved solids (TDS), nitrate- and ammonia-nitrogen, sodium and chloride concentrations. A qualified hydrologist shall prepare an annual report or	construction of Pond 8.	infrared photography, to be analyzed by a qualified hydrologist and compared to similar photos from prior to Pond 8 construction. After 5 years, the photography program shall be reassessed and may be discontinued if data has shown that Pond 8 has a less than significant effect on groundwater levels. OR Quarterly well monitoring of water levels and specific conductance. After 5 years, the well monitoring program shall be reassessed and may be discontinued if data has shown that Pond 8 has a less than significant effect on groundwater levels.	following construction of Pond 8, for a minimum of 5 years.	photography, and an annual written memorandum prepared by a qualified hydrologist. OR Quarterly well monitoring, and an annual written memorandum prepared by a qualified hydrologist.	

[1] A 1:6,000 scale is usually ideal for analyzing grassland hydrologic issues.

APPENDIX H

Ione WWTP Master Plan EIR
by RMT/MHA dated December 2009 -
Anti-Degradation

APPENDIX B

RESOLUTION 68-16 ANALYSIS

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RESOLUTION 68-16 Analysis

The City of Ione (City) will be filing a Report of Waste Discharge (ROWD) with the Regional Water Quality Control Board, Central Valley Region (RWQCB) for the discharge of tertiary treated wastewater to onsite, unlined percolation ponds. The City prepared this analysis to evaluate the proposed discharge in light of State Water Resources Control Board (SWRCB) Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality of Waters in California (Resolution). The Resolution directs that "existing high quality [water] will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in [State] policies" (emphasis added). The Resolution directs that any activities that result in discharges to "existing high quality waters" are required to use "the best practicable treatment or control [(BPTC)] of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained." The Resolution also notes that meeting "waste discharge requirements . . . will result in the [(BPTC)] of the discharge necessary to assure [(a) and (b) above]."

The analysis herein demonstrates that the City's proposed discharge of tertiary treated wastewater to percolation ponds complies with Resolution 68-16.

Wastewater Treatment Facility Description and Treatment Process

The City of Ione currently operates two wastewater treatment and disposal facilities, the City of Ione Wastewater Treatment Plant (WWTP) and the Castle Oaks Water Reclamation Plant (COWRP).

City's Secondary WWTP

The City of Ione WWTP, otherwise known as the City's Secondary WWTP, is located directly south of Sutter Creek at the corner of Marlette Street and Old Stockton Road. The original facility was constructed in 1958 and was modified and expanded multiple times in succeeding years.

This facility treats wastewater generated by the City and primarily of residential origin but includes filter backwash water from the Ione Water Treatment Plant operated by Amador Water Agency (AWA). The hydraulic, treatment, and disposal capacity of the existing facility is approximately 0.55 million gallons a day (MGD). The actual disposal capacity of the percolation ponds is higher than the treatment capacity and is approximately 0.78 MGD, but the excess capacity is reserved for Amador Regional Sanitation Authority (ARSA).

Wastewater enters the City's Secondary WWTP from three collection sewers which combine at the headworks where flow is diverted into one (or both) of two open concrete channels. In the channel, a portion of the sand and gravel in the wastewater is removed via gravel traps. Downstream of the channel are communitors, which grind and shred any solids. The untreated wastewater is then pumped by up to three pumps to ponds for further treatment and disposal.

There are a total of seven ponds. Four of the ponds (Ponds 1 through 4) are aerated wastewater treatment ponds and the remaining three (Ponds 5 through 7) are percolation ponds. The untreated wastewater from the headworks arrives at Pond 1 where two surface aerators supply the required oxygen to produce an aerobic zone. Gradually, the wastewater moves to Pond 2, where oxygen is also supplied by one surface aerator. The aerators in Ponds 3 and 4 help to maintain a minimum dissolved oxygen concentration. By Pond 4, the wastewater has completed its cycle and is considered secondary treated wastewater that is in compliance with regulations for effluent evaporation and percolation.

The three remaining ponds (Ponds 5 through 7) are percolation ponds, which use a combination of evaporation and percolation to provide final treatment and disposal of the secondary treated wastewater. Pond 5 receives secondary treated wastewater. Pond 6 is typically only utilized for ARSA wastewater during the wet months of the year when the Castle Oaks Golf Course does not require irrigation. The final pond, Pond 7 is intended to accommodate excess wastewater from Ponds 5 and 6. Since the secondary WWTP is currently at or near capacity, Pond 6 and sometimes Pond 7 may contain treated secondary wastewater throughout the year and not just during the wet months.

Castle Oaks Water Reclamation Plant

The COWRP is located on Five Mile Drive, north of Sutter Creek. Tertiary water from the plant is delivered to the Castle Oaks Golf Course for landscape irrigation and use in a series of decorative ponds. COWRP provides all the water for the golf course during the dry season and does not operate continuously. Water is treated to Title 22 standards before it is used for irrigation of the Castle Oaks Golf Course.

Tertiary treatment is provided to meet Department of Health Services standards, and is accomplished by chemical enhanced sand filters and disinfection with liquid sodium hypochlorite. Treatment facilities to provide Title 22 tertiary treatment include:

- Headworks
- Tertiary Sand Filters (four filter cells with two filters per cell)
- Chlorine Mix Tank and Contact Basin (for a detention time of 120 minutes at a design flow of 1.2 MGD)
- Effluent Pump Station
- Chemical Feed Systems

Proposed Water Reclamation Facility

Section 2.3 of the EIR provides an overview of the City's Existing System. Section 2.4 contains a detailed description of the Project, Part II of which involves disposal. Disposal of treated wastewater is addressed in more detail in Section 2.4.4.

The new treatment facilities will consist of a single facility with an average dry weather flow (ADWF) design capacity of 0.8 MGD, expandable to 1.6 MGD. The new facilities will provide for tertiary treatment of all wastewater flows, and include influent pumping, preliminary treatment (screening and grit removal), activated sludge biological treatment with nutrient (nitrogen) removal, Title 22 tertiary filtration and treatment, Title 22 ultraviolet (UV) disinfection of effluent, a recycled water pumping station, and a distribution pipeline to the COWRP. Auxiliary facilities include a control building, odor control, sludge digestion, and biosolids dewatering facilities. The proposed facilities contemplate closure of Ponds 1 through 4, lining or partially filling Ponds 5 and 6 within 200 feet of Sutter Creek, and construction of percolation Pond 8 to accommodate disposal of tertiary treated water.

The proposed treatment facility will meet BPTC by use of activated sludge, biological nutrient removal, chemical enhanced filtration, and disinfection for the treatment of City wastewater. A discussion of each technology is presented below.

Activated Sludge: Wastewater contains carbon based waste material which in nature is treated by bacteria that reduces (digests) and consumes the waste. Waste in large enough concentration can result in depletion of oxygen and result in anaerobic conditions in either surface waters or shallow groundwater.

Currently treatment at the WWTP is accomplished utilizing mechanically aerated treatment ponds. Ponds produce relatively good effluent quality but this quality can be impacted by seasonal conditions including algae growth, changes in pH, temperature, and solar radiation. To meet BPTC, the City proposes use of an activated sludge system to reduce biological oxygen demand (BOD). This technology will provide an effluent with the lowest BOD concentrations and eliminate many of the operation variables seen in the current treatment system. Further, this technology is well understood and has been demonstrated to be successful throughout the United States.

Nutrient Removal: The City's proposed treatment system will provide nutrient removal in the form of nitrogen compound reduction. Nitrogen can be present in wastewater in various forms including ammonia, organic nitrogen, nitrite, and nitrate. The goal of the City is to reduce total nitrogen to the lowest obtainable value by conversion of aqueous nitrogen to nitrogen gas. To meet BPTC the proposed treatment systems will nitrify and denitrify aqueous nitrogen.

Filtration: The City proposes to meet BPTC by filtration of all secondary effluent prior to discharge. Filtration will be accomplished utilizing technology approved by the California Department of Public Health for Title 22 filtration. Filtration will be enhanced utilizing chemical polymer to create ionized floc to remove small particulates suspended in the effluent. Filtration will reduce effluent concentrations of suspended material including bacteria, and precipitated chemicals like iron and manganese. Currently the City has no filtration system.

Disinfection: To meet BPTC, the City proposes to utilize California Department of Public Health -approved ultraviolet (UV) light disinfection technology to destroy biological pathogens in the effluent. Ultraviolet light is superior for disinfection when compared to sodium hypochlorite or chlorine gas and meets BPTC because UV does not create chlorinated hydrocarbon compounds (trihalomethanes), increase dissolved solids concentrations, require chemicals for dechlorination, and is not a material risk management issue. Currently the City has no disinfection system.

Regional Hydrogeology

Section 3.1.1 of the EIR contains information related to the watershed, groundwater aquifers, hydrography, groundwater levels and movement, as well as existing water quality information in the vicinity of the proposed discharge. Information related to the proposed disposal methods can be found on pages 3.1-38 through 3.1-43; 3.1-45 through 3.1-49 of the EIR.

Wastewater Disposal Alternatives

The proposed Project consists of the development and use of onsite, unlined percolation ponds, designed to accommodate all of the City's treated wastewater. Alternative (or additional) water disposal options were evaluated as part of the overall process, but none of the other disposal options were deemed feasible. A full discussion of disposal alternatives can be found in Section 5 of the EIR.

Water Quality Objectives

Potential groundwater beneficial uses in the vicinity of the Project are outlined in the Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Basin Plan). Such beneficial uses for groundwater include municipal (MUN), agricultural (AGR), industrial (IND), and industrial process supply (PRO) uses. The Basin Plan identifies water quality objectives (WQOs) for groundwaters, which include bacteria (total coliform) limits. Limits for chemical constituents are based on maximum contaminant levels (MCLs) and other Water Quality Goals for dissolved chemical constituents published by the State of California and the Central Valley Regional Water Quality Control Board.[1] The Basin Plan also contains narrative limits for taste and odor, and toxicity. Numerical WQOs employed in this analysis are listed in Table R-1 by constituent. Table R-2 shows the various water quality goals used to define the WQOs for this site.

Receiving Groundwater Quality

The characterization of background groundwater quality herein is derived from reports of laboratory analyses of groundwater samples collected from 2003 to 2008 at upgradient wells MW1 and MW1A. All data were previously reported to the Regional Water Quality Control Board. The data from MW-1 were statistically evaluated using EPA software (ProUCL, V4.00.02). Within the data set of 26 samples from MW-1, normally distributed populations (95 percent confidence) were present for total Kjeldahl nitrogen (TKN), calcium, total boron, total sodium, chloride, total dissolved solids, and total manganese. Total nitrate as nitrogen, total iron and sulfate data were not normally distributed, which indicates that these constituents are influenced by non-random processes. Time-series plots of the constituent data did not display obvious long-term trends. Therefore, the data set is a reliable indicator of the background groundwater quality for most constituents upgradient of the proposed discharge. The MW-1A data set had only six samples and was not evaluated statistically.

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[1] Central Valley Regional Water Quality Control Board, *A Compilation of Water Quality Goals*, July 2008.

The average values for each constituent were calculated separately for MW1 and MW1A. In calculating these averages, non-detects were valued at half the reporting level, a common convention for estimating averages in samples with non-detect values. Data from MW-1A indicated higher upgradient concentrations of salts (sodium, chloride, etc) than upgradient well MW-1. This is most likely attributable to the fact that well MW-1A draws water from both the alluvial deposits and the underlying Ione formation, whereas MW-1 draws only from alluvial deposits (see well logs, attached). Higher background salinity in Ione formation wells is documented in Section 3.1.1 of the EIR. Local beneficial uses for groundwater include wells into the Ione formation; therefore, the samples for MW1 and MW1A were combined and the constituent averages were calculated. The resulting three sets of data (MW1, MW1A, and MW1 plus MW1A) are used below to characterize background groundwater quality. The tabulated averages are listed in Table R-1 and the source data are listed in Table R-3.

From Table R-1, average total iron in MW1 and MW1A and average total manganese in MW1A exceeded the California Secondary MCLs for iron and manganese (Table R-2). The Primary and Secondary MCL values are based on dissolved concentrations in groundwater, not total values. Total analyses include undissolved constituents attached to solid particles. These constituents have been described as artifacts of the sampling process that do not truly represent the constituents that are mobile in a normal groundwater flow regime.[2] Rapid well-entry flow velocities resulting from monitor well sampling protocols such as bailing or rapid pumping entrain solids in the sample. A number of filtered samples, which measure only the mobile constituents in groundwater, were collected and tested in 2007 and 2008. The result of these tests for manganese and iron are listed separately in Table R-1 and demonstrate that dissolved concentrations of iron and manganese are orders of magnitude less than total constituent concentrations. This effect is true for effluent chemistry, discussed below, as well as groundwater.

Average water quality results from monitoring well MW-1 samples collected from 2003 to 2008 indicate that groundwater has exceeded WQOs for coliform bacteria in 3 of 26 samples. No other background groundwater constituents upgradient from the proposed tertiary treatment facility exceed WQOs.

<u>Wastewater Quality</u>

Data from monthly grab water samples from the existing plant effluent for the period 2003 to October 2009 were averaged for each constituent and are listed in Table R-1. The source data are provided in Table R-4. Anticipated average constituent concentrations of effluent from the proposed facility were derived from existing effluent data, modified for the effects of the proposed additional treatment systems: activated sludge removal, nitrogen removal, filtration and disinfection.

The City's proposed new treatment plant is anticipated to have treatment effectiveness for bacteria, biochemical oxygen demand, suspended solids, and total nitrogen that meet typical standards for modern tertiary facilities. (i.e., TCO<2.2 mpn/100ml, BOD<20 mg/L, TSS<20

[2] Zemo, Dawn A., 2009, *Suggested Methods to Mitigate Bias from Nondissolved Petroleum in Ground Water Samples Collected from the Smear Zone*. Ground Water Monitoring and Remediation, v29, no.3/Summer 2009/ pages 77-83

mg/L, TN<5 mg/L). The additional filtering treatment described above in the section titled "Proposed Water Reclamation Facility" will act to reduce from current levels the iron and manganese in the future effluent. As described above, only dissolved iron and manganese constituents pose a potential threat to groundwater. There is no effluent data on dissolved manganese or dissolved iron; however, based on the reduction observed from side-by-side testing of total and dissolved values reported for groundwater, it is anticipated that the concentration of dissolved iron in effluent will be approximately 2 percent of current total iron values, and the concentration of dissolved manganese in effluent will be approximately 17 percent of current total manganese values.

Anticipated water quality of the proposed effluent is listed in Table R-1. None of the anticipated constituent concentrations exceed WQOs.

Degradation Analysis

Comparisons of anticipated effluent constituent concentrations with those of background groundwater indicate minor potential to degrade groundwater, but no threat to cause groundwater to exceed WQOs. Shaded cells in Table R-1 indicate anticipated effluent constituents that exceed background groundwater. These include electrical conductivity, total dissolved solids, total boron, chloride, dissolved manganese, total potassium, and total sodium.

Conservatively ignoring dilution from mixing and other attenuation in groundwater, the worst degradation possible is the difference between anticipated effluent and background groundwater. For all constituents highlighted in Table R-1, this difference is a fraction of the difference between existing groundwater quality and WQOs. For example, anticipated total dissolved solids in effluent will be 222 mg/L while the average background groundwater is 210 mg/L. The difference, 12 mg/L, is the maximum anticipated degradation. The WQO for TDS is 450 mg/L and the difference between the WQO and current quality groundwater is 240 mg/L. Thus the maximum anticipated groundwater degradation is 5 percent (12/240 = 0.05) of the range to the WQO. In a similar manner, the percentages of the maximum anticipated allowable degradation were calculated for each effluent constituent with potential to degrade groundwater.

Electrical conductivity = 5%
Total dissolved solids = 5%
Boron = 25%
Chloride = 20%
Dissolved manganese = 21%
Potassium and sodium do not have WQOs.

The degradation indicated by these calculations is consistent with Resolution 68-16 because it does not threaten to cause groundwater downgradient of the proposed facility to be of lesser quality than set in guidelines. Effective treatment of sanitary wastes is consistent with the maximum benefit to the people of the State and BPTC described above will be employed to minimize potential degradation of existing high quality water.

Conclusions

The analysis summarized herein indicates that the proposed discharge would not create a condition of pollution or nuisance, and would maintain the highest water quality consistent with maximum benefit to the people of the State. Tertiary treated wastewater with ultra-filtration disinfection is BPTC, thus ensuring the highest water quality of wastewater disposed to the percolation ponds. Although disposal to the percolation ponds could cause minor degradation of groundwater quality for some constituents described above, this degradation will not exceed WQOs. Moreover, since the proposed treatment is BPTC, and compliance with waste discharge requirements constitutes BPTC under the express language of Resolution 68-16, the City's proposed discharge is consistent with Resolution 68-16.

Based on the analysis set forth herein, any groundwater degradation from baseline quality is *de minimus*, and no constituents would be discharged at rates that exceed WQOs (or MCLs). Further, the proposed tertiary treated wastewater discharge is utilizing BPTC, is in the best interest of, and is consistent with, the maximum benefit to the citizens of the State of California, and will not unreasonably affect present and anticipated future beneficial uses of the groundwater.

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Table R-1 Water Quality Objectives, Receiving Water Quality and Anticipated Effluent Water Quality

				2007-2009 MW-1A		2003-2009		
			Receiving Groundwater			Effluent		
Constituent	Units	Water Quality Objective[1]	MW-1 Average[2]	MW-1A Average[2]	MW-1 + MW-1A Average[2]	Anticipated Effluent Monthly Average	Exist. WWTP Effluent Avg.	Notes on basis for Anticipated Effluent values
Fecal Coliform	MPN/100 mL	2.2	-	-	-	<2.2	-	Ttile 22
Total Coliform	MPN/100 mL	2.2	-	-	-	<2.2	-	Title 22
Biological Oxygen Demand (BOD_5)	mg/L	20	-	-	-	<10	30	Title 22
Total Suspended Solids	mg/L	20	-	-	-	<10	-	Title 22
pH		6.4-8.4	6.8	6.7	6.8	6.4-8.4	8.1	Title 22
Electrical Conductivity	µmhos/cm	900	279	418	344	371	371	Existing effluent
Solids, Total Dissolved	mg/L	450	191	277	210	222	222	Existing effluent
Ammonia as N (NH3-N)	mg/L	1.5	-	-	-	<1	10.8	Typical for modern plant
Nitrate as N (NO2-N)	mg/L	10	0.5	1.1	0.7	<5	2.3	Typical for modern plant
Nitrite as N (NO3-N)	mg/L	1.0	-	-	-	<1	1.6	Typical for modern plant
TKN		-	0.5	1.1	0.7	?	14.5	Not estimated
Total Nitrogen (TN)		10	1	2	1	<7	18.4	TN=TKN+(NO3-N)+(NO2-N)
Aluminum, total	mg/L	0.2	-	-	-	0.08	0.08	Existing effluent
Arsenic	mg/L	0.010	0.002	0.005	0.003	0.002	0.002	Existing effluent
Barium	mg/L	1	-	-	-	0.08	0.08	Existing effluent
Boron	mg/L	0.70	0.05	0.08	0.06	0.22	0.22	Existing effluent
Calcium	mg/L	-	32	45	34	10.8	10.8	Existing effluent
Chloride	mg/L	106	8.0	24.3	11.7	30.6	30.6	Existing effluent
Copper	mg/L	0.2	-	-	-	0.014	0.014	Existing effluent
Iron	mg/L	-	0.49	1.44	0.70	-	0.33	Total iron reduced by filtration
Iron, dissolved	mg/L	0.300	0.015	0.017	0.016	0.008	-	2% of total Fe in existing effluent
Magnesium	mg/L	-	14	16	15	3.4	3.4	Existing effluent
Manganese	mg/L	0.050	0.022	0.074	0.032	-	0.09	Total Mn reduced by filtration
Manganese, dissolved	mg/L	0.050	0.005	0.006	0.005	0.015	-	17% of total Mn in existing effluent
Potassium	mg/L	-	1.4	1.1	1.1	9.5	9.5	Existing effluent
Sodium	mg/L	-	9.4	21.8	12.0	36	36	Existing effluent
Sulfate	mg/L	250	25.3	21.2	24.6	22	22	Existing effluent

anticipated effluent exceeds background groundwater (MW-1 and MW-1A combined)

Notes
1 See Table R-2
2 Averages include values of 1/2 the detection limit for non-detects, data in Table R-3
Bacterial testing not averaged for groundwater due to infrequent sporadic detections.

Table R-2. Water Quality Objectives used in Ione Treatment Plant Degradation Analysis

Constituent	Units	WQO	CA MCL Limit, pmcl	CA MCL Limit, smcl	FED MCL Limit, pmcl	FED MCL Limit, smcl	CA Toxicity Action Level	Agricultural Water Quality Limits	Fed Taste, Odor, Welfare	Notes
Fecal Coliform	MPN/100 mL	2.2	2.2	2.2	2.2	2.2				Basin Plan
Total Coliform	MPN/100 mL	2.2	2.2	2.2	2.2	2.2				Basin Plan
Biological Oxygen Demand (BOD_5)	mg/L	20								Title 22
pH		6.4-8.4				6.4-8.4				Title 22
Turbidity	NTU	-		5	1/ 0.5 /0.3					Title 22
Electrical Conductivity	µmhos/cm	900		900						Title 22 (Table 64449-A)
Total Dissolved Solids	mg/L	450		500		500		450	250	Agricultural limit
Ammonia as N	mg/L	1.5							1.5	Taste and Odoer
Nitrate as N	mg/L	10	10		10					Drinking Water Std
Nitrite as N	mg/L	1	1.0		1.0					Drinking Water Std
TKN		-								
Total Nitrogen		10								total convertable nitrogen
Aluminum, total	mg/L	0.2	1.0	0.2		.05 -0.2		5		RWQCB Water Quality Goals
Arsenic	mg/L	0.01	0.050/0.010		0.010			0.1		Title 22 (Table 64431-A)
Barium	mg/L	1.0	1.0		2.0					Title 22 (Table 64431-A)
Boron	mg/L	0.70					1.0	0.70/0.75		Agricultural limit
Calcium	mg/L	-								No limit
Chloride	mg/L	106		250		250		106		Agricultural limit
Copper	mg/L	0.2	1.3	1.0	1.3	1.0		0.2	1.0	Agricultural limit
Iron, dissolved	mg/L	0.30		0.3		0.3		5	0.3	Title 22 (Table 64449-A)
Manganese, dissolved	mg/L	0.05		0.05		0.05		0.2	0.05	Title 22.(Table 64449-A)
Potassium	mg/L	-								No limit
Sodium	mg/L	-								No limit
Sulfate	mg/L	250		250	500	250				Title 22 (Table 64449-B)

pmcl= primary maximum contaminant level (health based)
smcl= secondary maximum contaminant level (taste and odor based)

Table R-3 City of Ione WWTP - Groundwater Quality

			Field Measurements										Laboratory Analyses																																			
Sample ID	MP Elevation	Date	Depth to Water	Ground-Water Elevation	Volume Purged, gal.	Temp.	Field pH	Field EC	Dissolved Oxygen	Oxydation / Reduction Potential	Field TDS	Turbidity	Total Coliform Bacteria (TCO)		Fecal Coliform Bacteria (FCO)		Nitrate (as N)[1]	Kjeldahl Nitrogen (as N)		Total Dissolved Solids (TDS)	Chloride		Sulfate	Total Sodium	Dissolved Sodium	Total Magnesium	Total Potassium	Total Calcium	Total Arsenic		Total Boron		Dissolved Boron	Total Iron		Dissolved Iron		Total Manganese		Dissolved Manganese		Ammonia	Nitrite (as N)	TOC	E Coli Bacteria	Fecal Strep	MEK	Lab EC
		Units	ft	ft msl	gal	deg C	std units	umhos/c	mg/l	Mv	mg/l	NTUs	MPN/100ml		MPN/100ml		mg/l	mg/l		mg/l	mg/l		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l		mg/l		mg/l	mg/l		mg/l		mg/l		mg/l		mg/l	mg/l	mg/l	MPN/100ml	MPN/100ml	ug/l	umhos/cm
(Secondary MCL where shaded)		MCL					6.5-8.5	900				5	2.2		2.2		10			500	250		250						0.050					0.3		0.3		0.05		0.05			1.0					900
MW1	274.17	7/16/02	12.25	261.92			6.90						23	23	-2	1	2.40	3.8	3.8	190	6.3		23	10.0			1.4	33.0						0.160	0.16			-0.030	0.015									
MW1		6/30/03	11.72	262.45			6.80					9.2	-2	1	-2	1	0.55	-1.0	0.5	162	6.6		24	8.7			1.17	28.0			-0.01	0.005		0.810	0.81			0.020	0.02									
MW1		9/30/03	14.98	259.19			6.90					15.0	-2	1	-2	1	0.51	-1.0	0.5	143	6.7		22	8.2			1.24	27.0			-0.10	0.05		1.120	1.12			0.040	0.04									
MW1		12/31/03	10.97	263.20			6.80					1.3	-2	1	-2	1	0.74	-1.0	0.5	170	8.5		19	8.6			1.22	31.0			-0.10	0.05		0.090	0.09			-0.020	0.01									
MW1		3/31/04	10.22	263.95			6.80					0.64	23	23	-2	1	1.70	-1.0	0.5	217	8.4		30	9.2			1.25	33.0			-0.10	0.05		-0.050	0.025			-0.020	0.01									
MW1		6/30/04	12.55	261.62			6.80					3.1	-2	1	-2	1	1.20	-1.0	0.5	187	7.2		28	8.8			1.19	29.0			-0.10	0.05		0.310	0.31			-0.020	0.01									
MW1		10/1/04	14.82	259.35			6.90					-40	-2	1	-2	1	0.82	3.4	3.4	273	9.9		23		14.0		1.66	32.0			0.10	0.1		41.5				0.870										
MW1		10/12/04					6.80					24	-2	1	-2	1	1.20	-1.0	0.5	213	8.3		26	9.2			1.52	32.0			-0.10	0.05		4.72				0.100	0.1									
MW1		1/4/05	10.03	264.14			6.80					5.1	-2	1	-2	1	1.50	-1.0	0.5	196	9.8		24	9.6			1.46	33.0	-0.002	0.001	-0.10	0.05		1.01	1.01			-0.020	0.01									
MW1		4/7/05	8.15	266.02			6.90					3.0	-2	1	-2	1	2.70	-1.0	0.5	210	8.9		32	9.2			1.28	34.0	-0.002	0.001	-0.10	0.05		0.240	0.24			-0.020	0.01									
MW1		6/30/05	9.89	264.28			6.80					1.1	-2	1	-2	1	3.00	-1.0	0.5	191	8.1		30	9.0			1.27	32.0	-0.002	0.001	0.05	0.05		0.080	0.08			-0.020	0.01									
MW1		10/11/05			15	18.4	6.80	310	3.0	172		1.5	-2	1	-2	1	1.30	-1.0	0.5	175	7.0		30	9.9			1.3	33.0	-0.002	0.001	-0.05	0.025		0.130	0.13			-0.020	0.01									
MW1		2/9/06	9.21	264.96	8	17.5	6.90	320	5.7	106		0.54	-2	1	-2	1	2.00	-1.0	0.5	158	9.0		25	10.7			1.4	32.0	-0.0005	0.00025	0.09	0.09		0.055	0.055			-0.020	0.01									
MW1		5/23/06	9.92	264.25	14	16.3	6.80	330	13.4	281		4.6	2	2	-2	1	3.80	-1.0	0.5	215	7.2		25	9.5			1.26	37.0	-0.002	0.001	-0.05	0.025		0.320	0.32			-0.020	0.01									
MW1		8/24/06	11.61	262.56	12	17.8	6.80	340	5.6	284		7.5	-2	1	-2	1	2.20	-1.0	0.5	239	8.0		29	11.0			1.6	37.0	-0.002	0.001	0.05	0.05		0.830	0.83			0.036	0.036									
MW1		12/12/06					6.80					3.6	30	30	-2	1	0.99	-1.0	0.5	165	6.8		21	9.5			1.4	32.0	-0.002	0.001	0.06	0.06		0.310	0.31			0.020	0.02									
MW1		3/13/07			14	17.1	6.90		6.7	214		1.6	-2	1			0.81	-1.0	0.5	185	7.5		23	8.4			1.22	28.0	-0.002	0.001	0.06	0.06		0.130	0.13			-0.020	0.01									
MW1		6/25/07	11.36	262.81	8	17.5	6.90		8.0	284			2	2			0.84	-1.0	0.5	168	6.3		25	8.9			1.2	29.0	-0.002	0.001	0.06	0.064		0.036	0.036			-0.005	0.0025									
MW1		9/27/07	13.72	260.45	8	18.9	6.90	300	7.2	136		3.6	-2	1	-2	1	0.99	-1.0	0.5	156	6.7		22	9.8			1.4	28.0	-0.002	0.001	-0.05	0.025		0.170	0.17	-0.020	0.01	0.007	0.007	-0.005	0.0025	0.005		0.36				263
MW1		12/27/07	10.46	263.71	8	17.8	6.80	370	4.2	127		5.0	-2	1	-2	1	0.84	-1.0	0.5	232	10.0		23	9.8			1.5	30.0	-0.002	0.001	0.05	0.054		1.90	1.9	-0.020	0.01	0.077	0.077	-0.005	0.0025			0.55				282
MW1		7/7/08	11.89	262.28	6.75	17.24	7.04	291	7.9	126			-2	1	-2	1	0.66	-1.0	0.5	170	8.8		28	8.9			1.4	28.0	-0.002	0.001	0.068	0.068		0.620	0.62	-0.020	0.01	0.017	0.017	-0.005	0.0025			0.42				270
MW1		10/10/08	14.22	259.95	5.25	18.56	6.47	261	6.0	59.2			-2	1	-2	1	0.93	-1.0	0.5	186	9.3		23	8.5			1.3	29.0	-0.002	0.001	0.06	0.061		0.325	0.325	-0.020	0.01	0.0097	0.0097	-0.005	0.0025			0.32				279
MW1		12/29/08	11.96	262.21	6.75	18.22	6.70	298	3.4	130			-1.1	0.55			0.93	-0.042	0.021	210		13	23	11		14	1.5	35	-0.0083	0.00415	0.059	0.059		1.60	1.6	0.031	0.031	0.046	0.046	0.0025	0.0025			0.39	-1.1			308
MW1		3/11/09	9.56	264.61	7.5	14.28	6.86	292	5.4	126.3	191		-1.1	0.55			0.86	0.071	0.071	200	8.9		25	9.9		14	1.3	34.0	0.0083	0.0083	0.046	0.046		0.420	0.42	-0.050	0.025	0.013	0.013	-0.010	0.005			0.35	-1.1			273
MW1		6/16/09	10.89	263.28	7.5	17.12	6.75	284	5.3	3.0	185		-2	1	-2	1	0.98	-0.042	0.021	190	8.2		30	10		13	1.4	32	-0.032	0.016	0.057	0.057		0.30	0.3	-0.0093	0.00465	0.0068	0.0068	0.011	0.011			0.50				269
MW1		9/22/09	14.48	259.69	5.25	17.7	6.11	274	5.98	124.3	178	18.4	-2	1	-2	1	1.0	-0.2	0.1	160	6.5				9.0			32.0					0.065			0.022	0.022			0.011	0.011			0.35				286
		AVERAGE				17.5	6.8	305.8	6.3	155.2	184.7	3.6		3.1		1.0	1.3		0.5	190.8	8.0		25	9.4	11.5	14	1.4	40.0		0.0025		0.052	0.065		0.49		0.015		0.022		0.005			0.4	-1.1			278.8
MW1A		12/27/07	10.63	263.46	22	18.2	6.83		0.5	175		23	-2	1	-2.0	1.0	1.40	-1.0	0.5	301	29		19	25			1.1	47	-0.002	0.001	0.10			1.10		-0.020	0.01	0.070	0.07	0.014	0.014			1.10				408
MW1A		7/7/08	12.33	261.76	14.25	18.67	6.51	488	4.14	192			-2	1	-2.0	1.0	7.70	-1.0	0.5	283	16		24	19			0.86	44	-0.002	0.001	0.08			0.380		-0.020	0.01	0.015	0.015	-0.005	0.0025			0.82				445
MW1A		10/10/08	14.27	259.82	18.0	17.97	6.59	427	3.24	43			-2	1	-2.0	1.0	1.60	-1.0	0.5	297	44		17	26			1.3	48	0.0022	0.0022	0.11			6.31		-0.020	0.01	0.310	0.31	-0.005	0.0025			1.60				451
MW1A		12/29/08	12.41	261.68	14.25	18.70	6.64	445	2.96	168			2.2	2.2			3.20	0.098	0.098	290	28		20	27		17	1.5	51	-0.00083	0.000415	0.11			0.630		-0.072	0.036	0.033	0.033	0.00085	0.00085			0.89				452
MW1A		3/11/09	10.24	263.85	15.25	17.71	6.77	408	2.51	114.5	265		>1.1	1.1			3.90	0.081	0.081	270	14		23	19		17	1.0	40	0.00910	0.0091	0.0082			0.130		-0.050	0.025	0.015	0.015	-0.010	0.005			0.45	-1.1			384
MW1A		6/16/09	11.28	262.81	15.5	18.33	6.67	350	4.06	-26.7	227		-2	1	-2.0	1.0	3.0	-0.042	0.021	210	9.4		24	15		15	0.97		-0.032	0.016	0.078			0.079		-0.0093	0.00465	0.0038	0.0038	-0.0025	0.00125			0.39				334
MW1A		9/22/09	14.42	259.67	13.5	18.13	6.81	448	2.69	89.8	291	1000	-2	1	-2.0	1.0	3.5	6.3	6.3	290	30				20								0.100			-0.05	0.025			0.016	0.016			1.8				449
		AVERAGE				18.2	6.7	427.7	2.9	107.9	261.0	511.5		1.2		1.0	3.5		1.1	277.3	24.3		21	21.8	20.0	16	1.1	45.0		0.005	0.081		0.100	1.438			0.017		0.074		0.006			1.0	-1.1			417.6
AVERAGE MW1 and 1A						17.7	6.8	346.4	5.1	139.4	222.8	52.0		2.7		1.0	1.8		0.7	209.8	11.7		24.6	12.0	14.3	15.0	1.3	33.9		0.003	0.058		0.083	0.695			0.016		0.032		0.005			0.7	-1.1			343.5

Table R-4 City of Ione Existing Plant Effluent Wate r Quality

Parameter	Units	1/6/03	2/3/03	3/3/03	4/2/03	5/5/03	6/1/03	7/2/03	8/2/03	9/3/03	9/24/03	10/1/03	11/3/03	12/1/03
Fecal Coliform	MPN/100 mL													
Biological Oxygen Demand (BOD_5)	mg/L	23	35	26	29	67	90	42	49	126		21	39	39
Total Suspended Solids	mg/L													
Color														
Oil and Grease														
pH														
Settleable Solids														
Turbidity	NTU													
Odor (units)														
Electrical Conductivity	µmhos/cm	386	418	424	413	389	335	302	321	331	334	346	331	379
Solids, Total Dissolved	mg/L	184	187	204	244	220	242	259	224	237	178	232	234	195
Temperature	(°C)													
Dissolved Oxygen	mg/L													
Ammonia as N	mg/L													
Nitrate as N	mg/L	0.05	0.05	0.05	0.38	0.071	0.05	0.05	0.05	0.05	0.05	0.05	0.08	0.05
Nitrite as N	mg/L													
Nitrate plus Nitrite as N	mg/L	0.05	0.05	0.05	0.38	0.071	0.05	0.05	0.05	0.05	0.05	0.05	0.08	0.05
TKN	mg/L													
Total Nitrogen	mg/L													
Aluminum, total	mg/L													
Arsenic, dissolved	mg/L													
Barium	mg/L										0.1			
Boron	mg/L										0.23			
Calcium	mg/L										9.3			
Chloride	mg/L						33	31	30	27	31	30	26	31
Copper, dissolved	mg/L													
Iron	mg/L										0.23			
Magnesium	mg/L										2.64			
Manganese	mg/L										0.08			
Potassium	mg/L										8.84			
Sodium	mg/L						43	39	37	37		35	32	36
Sulfate	mg/L										18			
Zinc	mg/L	0.02	0.049	0.03	0.04	0.02								

Parameter	Units	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	Jul-04	Aug-04	Sep-04	Oct-04	Nov-04	Dec-04
Fecal Coliform	MPN/100 mL												
Biological Oxygen Demand (BOD_5)	mg/L	34	25	17	34	28	67	63	29	40	43	40	22
Total Suspended Solids	mg/L												
Color													
Oil and Grease													
pH													
Settleable Solids													
Turbidity	NTU												
Odor (units)													
Electrical Conductivity	µmhos/cm	389	425	415	372	437	304	303	293	320	316	413	447
Solids, Total Dissolved	mg/L	223	222	231	284	255	208	214	209	207	194	224	192
Temperature	(°C)												
Dissolved Oxygen	mg/L												
Ammonia as N	mg/L												
Nitrate as N	mg/L	0.07	0.05	0.05	0.38	0.05	0.1	0.05	0.05	0.055	0.11	0.09	0.14
Nitrite as N	mg/L												
Nitrate plus Nitrite as N	mg/L	0.07	0.05	0.05	0.38	0.05	0.1	0.05	0.05	0.055	0.107	0.09	0.14
TKN	mg/L	23	23	21	22	26	17	17	13	17	18	20	25
Total Nitrogen	mg/L												
Aluminum, total	mg/L												
Arsenic, dissolved	mg/L												
Barium	mg/L											0.1	
Boron	mg/L											0.19	
Calcium	mg/L											12	
Chloride	mg/L	31	30	30	31	32	29	27	28	26	25	33	29
Copper, dissolved	mg/L												
Iron	mg/L											0.7	
Magnesium	mg/L											3.6	
Manganese	mg/L											0.13	
Potassium	mg/L											10	
Sodium	mg/L	33	36	36	38	41	38	34	35	33	31	36	36
Sulfate	mg/L											22	
Zinc	mg/L												

Parameter	Units	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06	Jun-06
Fecal Coliform	MPN/100 mL																		
Biological Oxygen Demand (BOD_5)	mg/L	15	10	2	5	33	46	30	23	21	16	17	26	36		11	25	23	30.5
Total Suspended Solids	mg/L																		
Color																			
Oil and Grease																			
pH																			
Settleable Solids																			
Turbidity	NTU																		
Odor (units)																			
Electrical Conductivity	µmhos/cm	448	423	452	401	396	471	346	315	295	282	285	303	338	429	436	362	407	357
Solids, Total Dissolved	mg/L	217	218	231	213	296	241	248	201	223	199	210	253	180	217	214	222	204	216
Temperature	(°C)																		
Dissolved Oxygen	mg/L																		
Ammonia as N	mg/L																		
Nitrate as N	mg/L	0.33	0.87	1.1	0.67	1.8	4.2	1.3	2.6	4.1	2.8	7.5	10.2	2.3	1.2	1.2	1.9	2.1	5.5
Nitrite as N	mg/L																		
Nitrate plus Nitrite as N	mg/L	0.325	0.868	1.11	0.67	1.83	4.21	1.3	2.56	4.1	2.78	7.52	10.18	2.3	1.2	1.2	1.9	2.1	5.5
TKN	mg/L	20	19	19	17	18	12	7	5	5	5	5	8	15	19	18	11	12	6
Total Nitrogen	mg/L																		
Aluminum, total	mg/L										0.043								
Arsenic, dissolved	mg/L										0.004								
Barium	mg/L										0.1								
Boron	mg/L										0.23								
Calcium	mg/L										11								
Chloride	mg/L	27	25	30	26	34	34	33	34	31	31	33	30	25	24	26	22	21	29
Copper, dissolved	mg/L										0.03								
Iron	mg/L										0.3								
Magnesium	mg/L										2.3								
Manganese	mg/L										0.08								
Potassium	mg/L										9.2								
Sodium	mg/L	31	30	34	29	36	41	36	40	37	38	36	36	28	32	33	28	30	36
Sulfate	mg/L										29								
Zinc	mg/L										0.02								

Table R-4 City of Ione Existing Plant Effluent Wate r (

Parameter	Units	Jul-06	Aug-06	Sep-06	Sep-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
Fecal Coliform	MPN/100 mL																
Biological Oxygen Demand (BOD)	mg/L	14	16	16	32	17	9	12	17	22	45	16	20	13	24	29	28
Total Suspended Solids	mg/L																
Color																	
Oil and Grease																	
pH																	
Settleable Solids																	
Turbidity	NTU																
Odor (units)																	
Electrical Conductivity	µmhos/cm	314	288	283	275	451	479	439	475	452	363	315	284	293	358	318	409
Solids, Total Dissolved	mg/L	265	198	205	178	208	216	215	241	249	284	207	201	180	187	235	215
Temperature	(°C)																
Dissolved Oxygen	mg/L																
Ammonia as N	mg/L					22	22	19	19	13	1.9	0.6	0.5	2.8	7.4	6.1	15
Nitrate as N	mg/L	3.4	2.5	4.9	5.5	1.3	3.6	1.5	1.9	4.7	10.5	3.4	1.0	1.6	5.1	7.4	3.1
Nitrite as N	mg/L					0.1	0.1	0.2	0.6	5.7	3.8	2.4	0.6	0.6	1.7	1.2	0.2
Nitrate plus Nitrite as N	mg/L	3.4	2.5	4.9	5.5	1.4	3.7	1.7	2.5	10.4	14.3	5.8	1.6	2.2	6.8	8.6	3.3
TKN	mg/L	4	6	5	8												
Total Nitrogen	mg/L																
Aluminum, total	mg/L															0.086	
Arsenic, dissolved	mg/L				0.002											0.0024	
Barium	mg/L				0.05											0.05	
Boron	mg/L				0.21											0.25	
Calcium	mg/L				9.6											12	
Chloride	mg/L	30	27	27	25	26	28	28	28	28	31	32	31	33	32	30	29
Copper, dissolved	mg/L															0.0051	
Iron	mg/L				0.28											0.2	
Magnesium	mg/L				5.4											2.7	
Manganese	mg/L				0.084											0.098	
Potassium	mg/L				8.5											9.3	
Sodium	mg/L	36	33	33	33	31	31	29	36	34	39	36	38	37	39	39	37
Sulfate	mg/L				21											23	
Zinc	mg/L															0 026	

Parameter	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09
Fecal Coliform																						
Biological Oxygen Demand (BOD)	21	22	26	14	116	32	16	20	23	27	28	34	24	22	12	6.8	48	62	19	15	16	26
Total Suspended Solids																						
Color																						
Oil and Grease																						
pH													7.8	7.8	7.4	7.4	8.2	7.4	9.7	8.6	8.6	8 4
Settleable Solids																						
Turbidity																						
Odor (units)																						
Electrical Conductivity	410	395	430	475	452	363	315	284	293	358	318	409	454	461	423	518	453	342	307	310	316	318
Solids, Total Dissolved	201	214	251	241	249	284	207	201	180	187	235	215	214	182	200	241	266	220	289	253	231	266
Temperature																						
Dissolved Oxygen																						
Ammonia as N																						
Nitrate as N	1.1	1.3	1.5	2.3	3.3	3.6	3.6	5.4	6.2	5.6	9.9	4.6	1.2	0.5	0.2	0.3	2.4	3.2	0.26	1.70	4.10	4.90
Nitrite as N	0.1	0.2	0.2	0.6	5	1	1.5	2.3	1.1	1	4.2	3.8										
Nitrate plus Nitrite as N	1.2	1.5	1.7	2.9	8.3	4.6	5 1	7.7	7.3	6.6	14.1	8.4	1.2	0.5	0.2	0.3	2.4	3.2	0.26	1.70	4.10	4.90
TKN													26	29	22	27	22	5.6	6.20	5.70	5.00	5.60
Total Nitrogen																						
Aluminum, total												0.123										
Arsenic, dissolved												0.001										
Barium												0.05										
Boron												0.19										
Calcium												11										
Chloride	25	25	31	38	38	36	44	50	42	34	34	30	29	38	25	29	32	36	35	36	34	34
Copper, dissolved												0.007										
Iron												0.264										
Magnesium												3.8										
Manganese												0.063										
Potassium												11										
Sodium	30	29	35	39	43	42	45	49	42	40	35	38	36	33	29	33	36	48	41	46	48	40
Sulfate												20										
Zinc												0.038										

Parameter	Statistics: Count	Mean	Median	Min	Max	Std Dev	C.V.
Fecal Coliform							
Biological Oxygen Demand (BOD)	79	30	25	2	126	21	71%
Total Suspended Solids							
Color							
Oil and Grease							
pH	10	8.1	8.0	7.4	9.7	0.7	9%
Settleable Solids							
Turbidity							
Odor (units)							
Electrical Conductivity	81	371	363	275	518	63	17%
Solids, Total Dissolved	81	222	217	178	296	28	13%
Temperature							
Dissolved Oxygen							
Ammonia as N	12	11	10	1	22	9	79%
Nitrate as N	81	2	1	0.06	11	3	112%
Nitrite as N	24	2	1	0.10	6	2	106%
Nitrate plus Nitrite as N	81	3	2	0.05	14	3	121%
TKN	44	15	17	4	29	8	53%
Total Nitrogen							
Aluminum, total	3	0.08	0.09	0.04	0.12	0.04	48%
Arsenic, dissolved	4	0.002	0.002	0.001	0.004	0.001	53%
Barium	6	0.08	0.08	0.05	0.10	0.03	37%
Boron	6	0.22	0.22	0.19	0.25	0.02	11%
Calcium	6	11	11	9	12	1	11%
Chloride	76	31	30	21	50	5	16%
Copper, dissolved	3	0.01	0.01	0.01	0.03	0.01	89%
Iron	6	0.33	0.27	0.20	0.70	0.19	56%
Magnesium	6	3.4	3.2	2.3	5.4	1.1	33%
Manganese	6	0.09	0.08	0.06	0.13	0.02	26%
Potassium	6	9.5	9.3	8.5	11.0	0.9	10%
Sodium	75	36	36	28	49	5	13%
Sulfate	6	22	22	18	29	4	17%
Zinc	8	0.030	0.028	0.020	0.049	0.011	36%

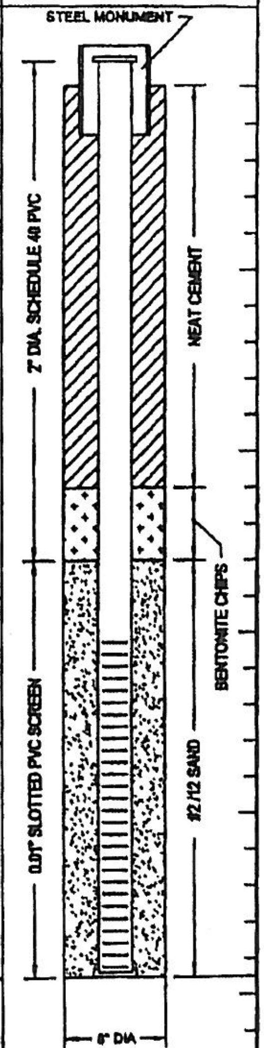
BORING NUMBER: MW1
DATE DRILLED: 6/19/02
LOGGED BY: JP

DRILL RIG/METHOD: CME-75 / 8 INCH HOLLOW STEM AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	PID	USCS	SOIL DESCRIPTION AND REMARKS
0							ML	Brown, moist, clayey silt, trace fine sand
5	■	MW1-1I	8					
10	■	MW1-2I	8					brown, very moist, sandy clayey silt soft
14							SM	Red brown, wet, loose, silty fine sand
15	■	MW1-3I	7					
18							GW	Brown, dense, wet, coarse sand to 1" gravel sandy gravel
								increasing gravel size with depth below 18'
20	■	MW1-4I	58					
25								
30								
35								
40								

Notes:
1. This log depicts conditions only at the boring location, see Plate No. 2, and only on the date of field exploration.
2. For an explanation of the symbols used in the boring log, see Plate No. 15.

WELL DIAGRAM



WALLACE • KUHL & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING
GEOLOGIC & ENVIRONMENTAL SERVICES

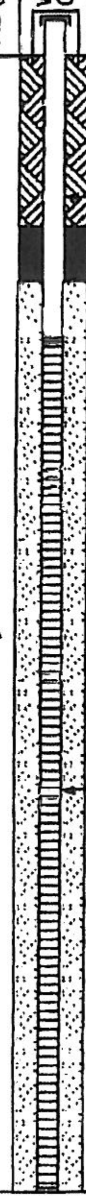
SOIL BORING LOG AND WELL CONSTRUCTION DETAIL
IONE WASTE WATER TREATMENT PLANT
Ione, California

WKA NO: 4857.01
DATE: 1/03
PLATE NO: 11

Project: Ione WWTP Project Location: Ione, California WKA Number: 4857.05	LOG OF MONITORING WELL 1A Sheet 1 of 2

Date(s) Drilled	8/7/07	Logged By	BMC	Checked By	PJJ
Drilling Method	Hollow Stem Auger	Drilling Contractor	V&W Drilling, Inc.	Total Depth of Drill Hole	41.5 feet
Drill Rig Type	BK-81	Diameter of Hole, inches	8"	Approx. Surface Elevation, ft MSL	274.1
Groundwater Level and Date Measured		Seal or Backfill	Neat Cement Grout Neat Cement Grout and Bentonite Chips		
Sampling Method(s)	Modified California Sampler	Drive Weights and Comments	140 lb Hammer falling 30 inches		

Elevation feet	Depth, feet	Number of Blows	GEOLOGIC AND ENGINEERING DESCRIPTION	Unified Soil Classification	PID (ppm)	WELL DETAILS AND REMARKS
	0		Native Soil: grass covered			Hand Auger to 5 feet below ground surface bgs)
	0–7.5		Sandy SILT (ML), dark brown, dry, firm, fine to medium grained sand, trace mica.	ML		
	2					Neat Cement Grout
						2-inch, blank Schedule 40 PVC
						Bentonite Chips
270	4					
	5–6.5	5, 6, 9				
	7					First encountered groundwater at approximately 7 feet bgs
	7.5		Alluvium (Qal): Clayey SILT with Sand (ML), reddish brown to gray, wet, soft, fine grained sand, low to non-plastic, trace black organic material.	ML		
265	10–11.5	3, 3, 5			NA	
	12					#2/12 Sand
	12.5		Sandy SILT with trace Gravel (ML), reddish brown, wet, soft, fine grained gravel, fine to coarse sand.	ML		2-inch, 0.010-inch slotted Schedule 40 PVC
260	14					
	15–16.5	3, 4, 4				
	17.5		Silty SAND (SM), reddish brown, wet, poorly cemented, fine to medium grained sand.	SM		
255	18					
	20					



ENVIRO WELL+SOIL LOG 4857.05 IONE WWTP.GPJ WKA.GDT 9/12/07 3:19 PM

Project: Ione WWTP Project Location: Ione, California WKA Number: 4857.05	**LOG OF MONITORING WELL 1A** Sheet 2 of 2

Elevation feet	Depth, feet	Sample Type	Number of Blows	Graphic Log	GEOLOGIC AND ENGINEERING DESCRIPTION	Unified Soil Classification		Well Construction	WELL DETAILS AND REMARKS
	20		31 50/6"		Silty SAND with trace Gravel (SM), reddish brown, wet, poorly cemented, increased sand content from 17.5-20.25 ft interval, fine to coarse grained sand (predominantly medium to coarse grained sand)	SM			
					Silty Gravelly SAND (SP-SM), reddish brown, wet, poorly cemented, rounded gravel to 1-inch diamter, fine to coarse grained sand, single 2-inch diameter gravel clast in sample shoe.	SP-SM			
	22				SAND with Silt and Gravel (SP-SM), reddish brown, wet, poorly cemented, fine rounded gravel, subangular to rounded fine to coarse grained sand (predominatly medium to coarse grained sand).	SP-SM			
250	24								
			50/6"						#2/12 Sand
	26								
	28				SAND with Silt (SP-SM), brown, wet, poorly cemented, angular to rounded fine to coarse grained sand,	SP-SM			
245									
	30		50/6"				NA		
					Sandy GRAVEL with Silt (GP-GM), brown, wet, poorly cemented, rounded gravel to 1.5-inch diamter, fine to coarse grained sand.	GP-GM			
	32								2-inch, 0.010-inch slotted Schedule 40 PVC
					SAND with Silt and Gravel (SP-SM), brown, wet, poorly cemented, angular to rounded fine gravel, medium to coarse grained sand.	SP-SM			
240	34								
			50/6"						
	36								
	38				IONE FORMATION (TI) Sandy CLAY to Clayey SAND (SC-CL), bluish gray, moist, firm, low plasticity, fine grained sand.	CL			
235									
	40		13 16 21						Bentonite Chips
	42				Total Depth = 41.5 feet bgs				
230	44								

ENVIRO WELL+SOIL LOG 4857.05 IONE WWTP.GPJ WKA.GDT 9/12/07 3:19 PM

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FIGURE A